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COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL
AFFAIRS
DEPARTMENT OF ENVIRONMENTAL QUALITY
ENGINEERING



GOVERNMENT DOCUMENTS
COLLECTION

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1986 AIR QUALITY REPORT

DIVISION OF AIR QUALITY CONTROL

ONE WINTER STREET 8TH FLOOR
BOSTON, MASSACHUSETTS 02108

November 1987

1986 AIR QUALITY REPORT
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I. INTRODUCTION

This report presents 1986 annual air quality data for Massachusetts, collected by the Division of Air Quality Control (DAQC), Department of Environmental Quality Engineering (DEQE). Data collected by the Commonwealth is also submitted to the U.S. Environmental Protection Agency (EPA) for inclusion into the National Aeromatic Data Bank. DAQC is responsible for measuring ambient air quality to verify compliance with state and national standards (see Table 1), to support development of regulations designed to reduce ambient air contaminants, to assess the effectiveness of existing air pollution control strategies, and to fulfill EPA reporting requirements (40 CFR 50) for air quality data. Table 2 gives a brief description of the health and welfare effects of the six criteria air pollutants.

The Massachusetts network of public air monitoring stations, both urban and rural, are located throughout the state, at 44 sites. The stations are equipped with air pollution monitoring equipment (see Table 3) and, in some cases, meteorological equipment. The continuous state air pollution monitors record hourly levels of the four gaseous criteria pollutants - ozone (O_3), carbon monoxide (CO), sulfur dioxide (SO_2) and nitrogen dioxide (NO_2). The non-continuous monitors record 24 hour total suspended particulates (TSP), lead (Pb), and PM_{10} samples. Meteorological parameters measured, in most instances, include wind speed, wind direction, and temperature. The Commonwealth's ambient air monitoring network is complemented by a private network of monitors. The private industrial sites are limited to monitoring sulfur dioxide, sulfates (SO_4), total suspended particulates, wind-speed, wind direction and temperature.

Figures 2, 3, 5, 6, 7, 8 and 10 illustrate the Commonwealth's air pollution control regions and public monitoring network maintained by DAQC in 1986 for the six criteria pollutants. Figures 4, 9 and 12 illustrate the private monitors in 1986 for SO₂, SO₄, and TSP.

This year, DAQC collected a total of 451,887 hourly samples at the public sites and 914,197 hourly samples at the private sites, for a total of 914,197 (see Figure 1). Daily Pollutant Standard Index values (April-October) were also calculated for the Eastern, Central and Western portions of the state.

The Commonwealth's data from public and private monitors have been summarized in this report for public record and information. For further information pertaining to this report and other related air quality problems, please contact either the Division of Air Quality Control at Boston (617) 292-5630 or the Regional Offices.

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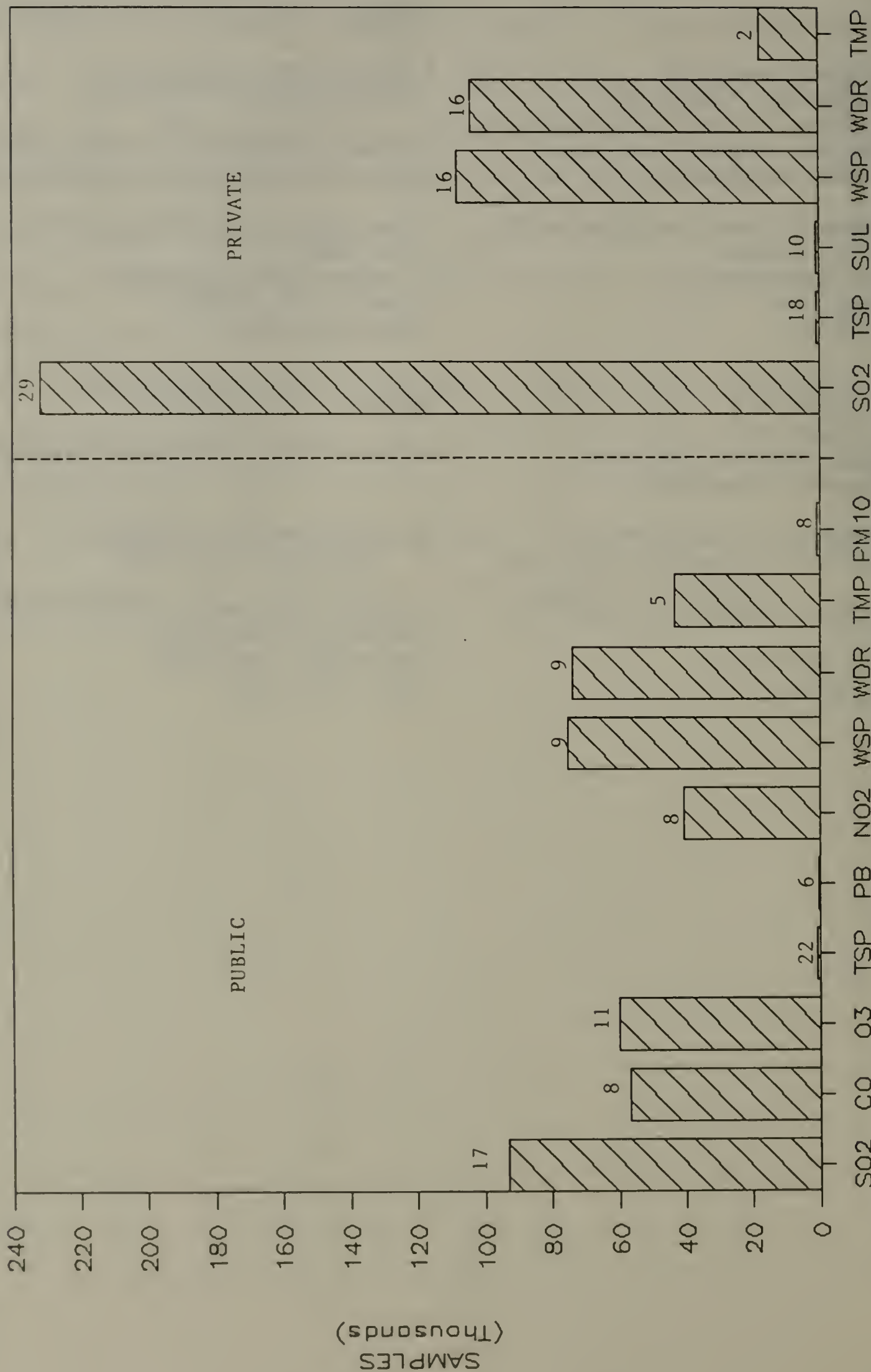
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Figure 1

SAMPLES FOR MONITORING SITES 1986

Public and Private



17 = Number of Monitoring Sites
 SO2 = Sulfur Dioxide
 CO = Carbon Monoxide
 O3 = Ozone
 TSP = Total Suspended Particulates
 PB = Lead
 NO2 = Nitrogen Dioxide
 PM10 = Particulates < 10 micrometers
 WSP = Wind Speed
 WDI = Wind Direction
 TMP = Temperature
 SUL = Sulfates

FIGURE 2: AIR POLLUTION CONTROL REGIONS

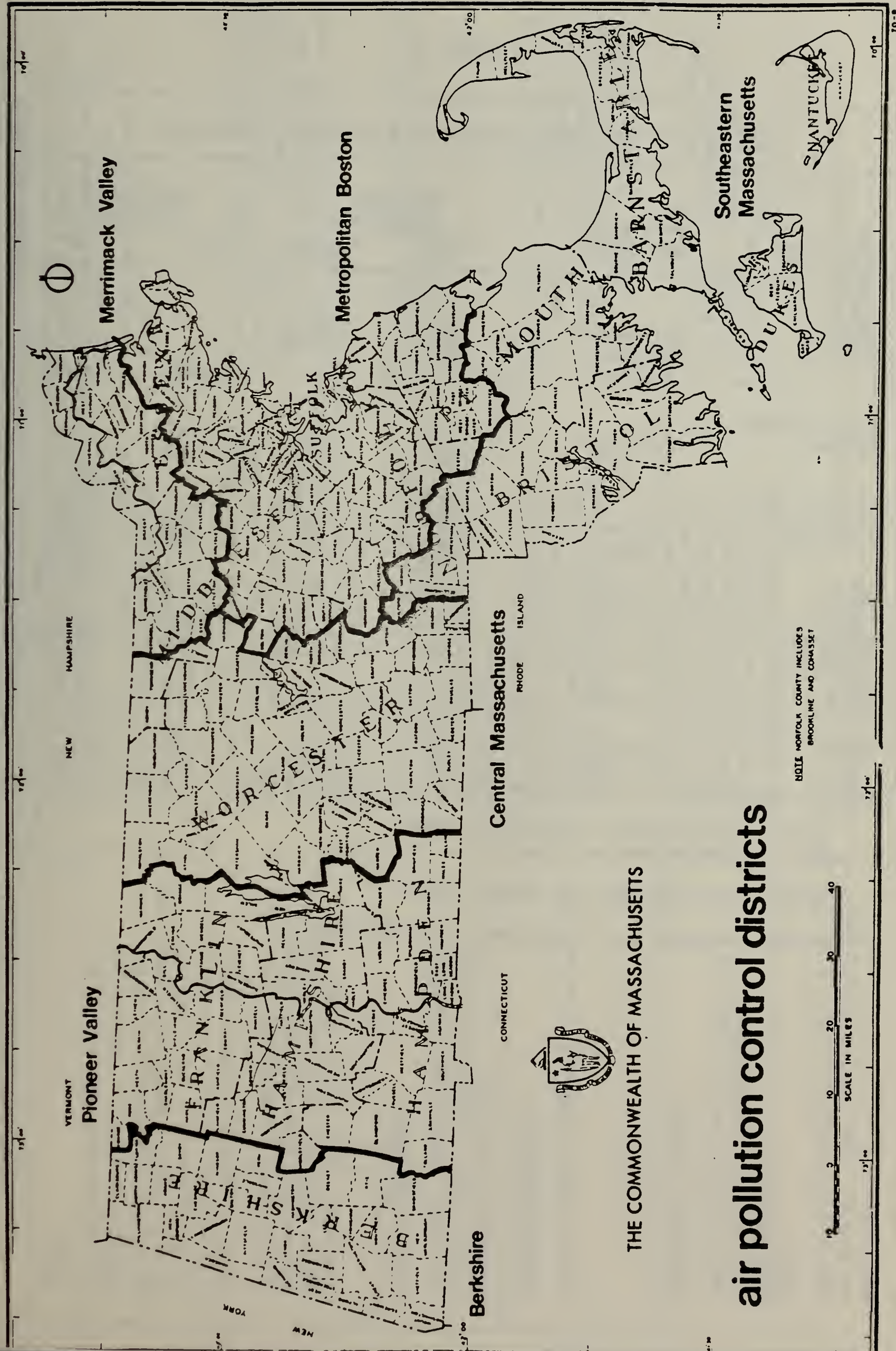


TABLE 1

| STATE AND NATIONAL AMBIENT AIR QUALITY STANDARDS | | | | | |
|--|-----------------------|---------------------|------|-----------------------|------|
| POLLUTANT | AVERAGING INTERVAL | PRIMARY STANDARD | | SECONDARY STANDARD | |
| | | ug/m ³ | ppm | ug/m ³ | ppm |
| Sulfur Dioxide | Annual | 80 | 0.03 | - | - |
| | 24 hour | 365 | 0.14 | - | - |
| | 3 hour | - | - | 1,300 | 0.5 |
| Particulate Matter | Annual | 75 | - | 60** | - |
| | 24 hour | 260 | - | 150 | - |
| Carbon Monoxide | 8 hour | 10* | 9 | 10* | 9 |
| | 1 hour | 40* | 35 | 40* | 35 |
| Ozone | 1 hour | 240 | 0.12 | 240 | 0.12 |
| Nitrogen Dioxide | Annual | 100 | 0.05 | 100 | 0.05 |
| Lead | 3 month | 1.5 | - | 1.5 | - |
| PM ₁₀ | Annual | 50 | - | 50 | - |
| | 24 hour | 150 | - | 150 | - |

ug/m³ - micrograms per cubic meter
 ppm - parts per million

*mg/m³ - milligrams per cubic meter

**annual average is considered a guideline

TABLE 2

HEALTH AND WELFARE EFFECTS OF AIR POLLUTANTS

| POLLUTANTS AND THEIR SOURCES | HEALTH EFFECTS | WELFARE EFFECTS |
|---|--|--|
| <u>Ozone</u> Product of reactions of motor vehicle exhaust, industrial process emissions and other fossil fuel combustion emissions in the presence of sunlight. | Causes breathing difficulty, especially when exercising, irritates eyes, respiratory infections. Acute exposures cause bronchoconstriction, lung edema and abnormal lung development. | Toxic to plants by causing both leaf damage and a decrease in growth. Can weaken materials such as rubber and fabrics. |
| <u>Total Suspended Particulates</u> Fossil fuel combustion emissions, industrial process emissions, motor vehicle exhaust, traffic movement over dusty roads. | Critical for those with chronic lung diseases, can alter the lungs' natural cleansing mechanism. They are composed of or adsorb to toxic materials. Particles smaller than 10 microns lodge deep in the lungs. | Cause soiling of materials, are corrosive and can damage buildings. Cause haze which reduces visibility and the amount of solar energy reaching the earth. |
| <u>Carbon Monoxide</u> Internal combustion engines, fossil fuel combustion, and cigarette smoking. | Reduces the blood's ability to carry oxygen which may cause heart and brain damage. Acute exposures can cause asphyxiation. | No known effect on materials or vegetation. |
| <u>Sulfur Dioxide</u> Fossil fuel combustion emissions. | Irritation of throat and lungs and aggravation of symptoms among those with chronic lung diseases such as asthma and bronchitis. | Corrosion and deterioration of metals, brittleness of paper, discoloration of paint and deterioration of fabric. Leaf damage to some plants. |
| <u>Nitrogen Dioxide</u> Emitted from motor vehicles and fossil fuel burning operations. | Aggravation of symptoms in those with asthma and chronic bronchitis and increased susceptibility to respiratory infections | Fading of dyes, yellowing of leaves on plants, and changing the horizon to a reddish brown color. |
| <u>Lead</u> Emitted from motor vehicle exhausts, some incinerators and smelters. | Mental retardation, brain and other organ damage. | No direct impact on vegetation. |

TABLE 3

ANALYSIS COLLECTION METHOD LISTING*

| | | | | |
|-------------------------------|---------------------------------------|-------------|--------|-------|
| Sulfur Dioxide: | | | | |
| 14 | Coulometric | | | |
| 20 | Pulse Fluorescent Instrumental | | | P. 20 |
| Carbon Monoxide: | | | | |
| 11 | Non-Dispersive Infra-Red Instrumental | | | P. 26 |
| Ozone: | | | | |
| 11 | Chemiluminescence Instrumental | | | |
| 14 | Ultraviolet Photometric | | | P. 29 |
| Nitrogen Dioxide: | | | | |
| 14 | Chemiluminescence Instrumental | | | P. 32 |
| Total Suspended Particulates: | | | | |
| 92 | High Volume Air Sampler | | | P. 35 |
| Lead: | | | | |
| 92 | High Volume Air Sampler | | | P. 41 |
| Sulfate: | | | | |
| 91 | High Volume Air Sampler | | | P. 49 |
| PM10: | | | | |
| 01 | Low Volume | Gravimetric | SA244E | |
| 52 | High Volume | Gravimetric | SA321A | P. 51 |

* Corresponds to Instrument Method in Data Summaries.

TABLE 4 LIST OF EXCEEDANCES - PUBLIC SITES 1986

| POLLUTANT | LOCATION | AQCR | ADDRESS | SAROAD | MO. | DAY | TIME | LEVEL REACHED |
|---------------------------|-------------|----------------------|------------------------------|----------|---------|-----|------|-----------------------|
| CARBON MONOXIDE | | | | | | | | |
| (8 Hr. Average) | Boston | Met. Boston | Essex St. | 0240-022 | March | 03 | 1400 | 9.8ppm |
| | Boston | Met. Boston | Essex St. | 0240-022 | March | 03 | 1800 | 9.8ppm |
| | Springfield | Pioneer Valley | 1586 East Columbus | 2160-007 | Nov. | 26 | 1800 | 10.9ppm |
| | Springfield | Pioneer Valley | Sm. as above | 2160-007 | January | 19 | 0200 | 9.8ppm |
| | Worcester | Central MA | Thomas St. | 2640-020 | January | 19 | 0000 | 14.5ppm |
| | | | Fire Sta. | | | | | |
| (1 Hr. Average) | | | | | | | | |
| | | NO EXCEEDANCES | RECORDED | | | | | |
| NITROGEN DIOXIDE (Annual) | | NO EXCEEDANCES | RECORDED | | | | | |
| LEAD (Quarterly) | | NO EXCEEDANCES | RECORDED | | | | | |
| TSP (Annual) | | PRIMARY EXCEEDANCES. | RECORDED | | | | | |
| | Charlestown | Met. Boston | One City Sq. | 0240-027 | | | | 81.6ug/M ³ |
| SO ₂ (Annual) | | NO EXCEEDANCES | RECORDED | | | | | |
| (24 Hour Average) | | NO EXCEEDANCES | RECORDED | | | | | |
| (3 Hour Average) | | NO EXCEEDANCES | RECORDED | | | | | |
| OZONE | Agawam | Pioneer Valley | 152 Westfield St. | 0030-003 | July | 24 | 1600 | .127ppm |
| | | | | | June | 27 | 1300 | .125ppm |
| | Amherst | Pioneer Valley | Solar Habitat Experiment Hs. | 0060-002 | June | 27 | 1500 | .130ppm |
| | | | | | July | 24 | 1800 | .122ppm |
| | Chelsea | Met. Bost. | Powder Horn Hill | 0380-003 | July | 24 | 1300 | .125ppm |
| | | | | | July | 17 | 1200 | .123ppm |
| | Chicopee | Pioneer Valley | Anderson Rd., Westover AFB | 0400-008 | July | 24 | 1700 | .136ppm |
| | | | | | June | 27 | 1400 | .135ppm |

TABLE 4 LIST OF EXCEEDANCES - PUBLIC SITES 1986

| POLLUTANT OZONE (Cont) | LOCATION | AQCR | ADDRESS | SAROAD | MO. | DAY | TIME | LEVEL REACHED |
|---------------------------|-------------|---------------------|------------------------|----------|-----------------------------|----------------------|------------------------------|--|
| | Fairhaven | Southeast Mass. | Leroy Wood School | 0570-002 | June May June June | 14 30 15 23 | 1900 1700 1500 1800 | .151ppm .138ppm .138ppm .123ppm |
| | Newburyport | Merrimack Valley | NWR. HG Plum Island | 1520-003 | July July July | 24 17 18 | 1400 1300 1300 | .133ppm .128ppm .126ppm |
| | Ware | Pioneer Valley | Quabbin Summit | 2360-002 | July June June | 24 27 01 | 1700 1400 1800 | .131ppm .128ppm .127ppm |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|---|----------|----------------------------|-------------------|--|-----------------------|----|----|-----|-----|----|------|
| | | | | | SO2 | CO | O3 | NO2 | TSP | Pb | PM10 |
| PIONEER VALLEY AIR QUALITY CONTROL REGION (042) | | | | | | | | | | | |
| Agawam 152 South West- field St. | 0030-003 | <u>692120</u> 4659040 | 3 | Rural Agri- culture | | | X | | | | |
| Amherst Solar Habitat | 0060-002 | <u>704310</u> 4696060 | 3 | Rural - Agricultural | | | X | | | | |
| Chicopee Anderson Rd. Westover | 0400-008 | <u>701800</u> 4674020 | 3 | Suburban - Commercial | X | | X | | | | |
| Holyoke 1 Court Square | 0860-007 | <u>697480</u> 4675170 | 12 | Center City- Commercial | | | | | X | | |
| Springfield 1586 E. Columbus | 2160-007 | <u>699150</u> 4663550 | 6 | Center City- Industrial | | X | | | | X | X |
| Springfield Longhill Ave (Substations) | 2160-009 | <u>700193</u> 4661928 | 6 | Center City- Commercial | X | | | | | | |
| Springfield 59 Howard St. School | 2160-011 | <u>699460</u> 4663380 | 18 | Center City- Commercial | | | | | X | X | X |
| Springfield Fernbank St. | 2160-014 | <u>707080</u> 4668200 | 4 | Suburban - Commercial WS WD Temp | | X | | | | | |
| Springfield Community Tech. | 2160-015 | <u>700000</u> 4664500 | 15 | Center City- Residential | X | | | X | X | | |
| Ware Quabbin Summit | 2360-002 | <u>719700</u> 4686150 | 5 | Rural Agriculture WS WD | X | | X | X | X | | X |
| West Springfield Van Deene St. | 2475-003 | <u>696400</u> 4663940 | 7 | Suburban - Commercial | | | | | X | | |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|-----------------------|----------|----------------------------|-------------------|-----------------|-----------------------|----|----------------|-----------------|-----|----|------------------|
| | | | | | SO ₂ | CO | O ₃ | NO ₂ | TSP | Pb | PM ₁₀ |

BERKSHIRE AIR QUALITY CONTROL REGION (117)

| | | | | | | | | | | | |
|--|----------|-------------------|----|---------------------------|---|--|--|--|---|--|--|
| Pittsfield Roof of Berkshire Commons | 1800-006 | 643500 4699897 | 10 | Center City Commercial | | | | | X | | |
| Pittsfield Birchgrove Drive | 1800-007 | 646480 4700620 | 3 | Suburban Commercial | X | | | | | | |

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

| | | | | | | | | | | | |
|---|----------|--------------------|----|--|---|---|---|---|---|---|---|
| Fitchburg 5 Sumner St. | 0620-010 | 271050 4718500 | 14 | Center City Industrial | X | | | | | | |
| Warren River St. Region- al High School | 2372-001 | 732000 4677900 | 5 | Rural - Agricultural | | | | | X | | |
| Worcester 419 Belmont St. Health Dept. | 2640-013 | 272400 4683700 | 5 | Center City Residential | | | | | X | | |
| Worcester 2 Washington St. YWCA | 2640-016 | 269100 4682200 | 8 | Center City Commercial | | | | | X | X | X |
| Worcester DPW Yard, Belmont Ave. | 2640-019 | 272303 4683788 | 6 | Center City Residential WS WD Temp | X | | X | | | | |
| Worcester Thomas St. Fire Station | 2640-020 | 269300 4683000 | 3 | Center City Commercial | X | X | | X | | | |
| Worcester 26 Salisbury St. | 2640-021 | 2691000 4683650 | 9 | Center City Commercial | | | | | X | | |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|-----------------------|----------|----------------------------|-------------------|-----------------|-----------------------|----|----------------|-----------------|-----|----|------|
| | | | | | SO ₂ | CO | O ₃ | NO ₂ | TSP | Pb | PM10 |

BERKSHIRE AIR QUALITY CONTROL REGION (117)

| | | | | | | | | | | | |
|--|----------|-------------------|----|---------------------------|---|--|--|--|--|---|--|
| Pittsfield Roof of Berkshire Commons | 1800-006 | 643500 4699897 | 10 | Center City Commercial | | | | | | X | |
| Pittsfield Birchgrove Drive | 1800-007 | 646480 4700620 | 3 | Suburban Commercial | X | | | | | | |

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

| | | | | | | | | | | | |
|---|----------|--------------------|----|--|---|---|---|---|---|---|---|
| Fitchburg 5 Summer St. | 0620-010 | 271050 4718500 | 14 | Center City Industrial | X | | | | | | |
| Warren River St. Region- al High School | 2372-001 | 732000 4677900 | 5 | Rural - Agricultural | | | | | X | | |
| Worcester 419 Belmont St. Health Dept. | 2640-013 | 272400 4683700 | 5 | Center City Residential | | | | | X | | |
| Worcester 2 Washington St. YWCA | 2640-016 | 269100 4682200 | 8 | Center City Commercial | | | | | X | X | X |
| Worcester DPW Yard, Belmont Ave. | 2640-019 | 272303 4683788 | 6 | Center City Residential WS WD Temp | X | | X | | | | |
| Worcester Thomas St. Fire Station | 2640-020 | 269300 4683000 | 3 | Center City Commercial | X | X | | X | | | |
| Worcester 26 Salisbury St. | 2640-021 | 2691000 4683650 | 9 | Center City Commercial | | | | | X | | |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|--|----------|----------------------------|-------------------|---|-----------------------|----|----------------|-----------------|-----|----|------|
| | | | | | SO ₂ | CO | O ₃ | NO ₂ | TSP | Pb | PM10 |
| METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119) | | | | | | | | | | | |
| Boston Kenmore Square 590 Comm. Ave. | 0240-002 | <u>317100</u> 4690400 | 3 | Center City Commercial Temp 81103, 81104 | X | X | | X | | X | X |
| Boston Southampton St. Fire HQ | 0240-012 | <u>329580</u> 4688230 | 12 | Center City Commercial | | | | | X | | |
| Boston Kneeland St. Parking Lot | 0240-015 | <u>330000</u> 4690000 | 5 | Center City | X | X | | | | | |
| Boston 340 Breman St. E. Boston | 0240-021 | <u>330000</u> 4693550 | 4 | Center City Residential | X | X | | X | X | | |
| Boston Washington St. | 0240-022 | <u>330100</u> 4690750 | 4 | Center City Commercial | | X | | | | | |
| Boston 200 Columbus Ave. | 0240-024 | <u>329400</u> 4690350 | 5 | Center City Commercial | | | | | X | | X |
| Boston One City Square Charlestown | 0240-027 | <u>330100</u> 4693030 | | Center City Residential 81102 | | | | | X | X | X |
| Chelsea Power Horn Hill | 0380-003 | <u>3399000</u> 46961500 | 4 | Center City Residential WS WD | X | | X | X | X | | |
| Medfield Rt. 27 N. Meadow State Hospital | 1210-001 | <u>307200</u> 4675800 | 7 | Rural Commercial | X | | | | | | |
| Medford 100-120 Main St. Fire Headqtrs. | 1220-002 | <u>326300</u> 4697990 | 6 | Center City Commercial | | | | | X | | |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|-----------------------|----------|----------------------------|-------------------|-----------------|-----------------------|----|----------------|-----------------|-----|----|------------------|
| | | | | | SO ₂ | CO | O ₃ | NO ₂ | TSP | Pb | PM ₁₀ |

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119) (Cont.)

| | | | | | | | | | | | |
|--|----------|----------------------------|----|-------------------------------------|---|--|---|--|--|---|--|
| Quincy Hancock St., Atlantic Fire Station | 1880-007 | 332400 <u>4682100</u> | 3 | Suburban Residential | | | | | | X | |
| Sudbury Watertown Rd. Natl. Wildlife | 2196-001 | 303350 <u>4695100</u> | 5 | Rural Agricultural WS WD Temp | | | X | | | | |
| Watertown Victory Field | 2380-005 | 3203100 <u>46935000</u> | 4 | Center City Residential | X | | | | | | |
| Woburn Pleasant St. Court House | 2620-002 | 323000 <u>4705000</u> | 12 | Suburban Commercial | | | | | | X | |

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

| | | | | | | | | | | | |
|--|----------|--------------------------|---|----------------------------------|---|---|---|---|---|---|---|
| Lawrence High St. Storrow Park | 1000-005 | 342220 <u>4730590</u> | 4 | Center City Residential | X | | X | X | X | | X |
| Lowell 35 YMCA Drive | 1080-006 | 310370 <u>4722640</u> | 7 | Center City Commercial | | | | | X | X | |
| Lowell Old City Hall Merrimack St. | 1080-007 | 310400 <u>4723800</u> | 5 | Center City Commercial | | X | | | | | |
| Newburyport NWR H Quarters Plum Island | 1520-003 | 351300 <u>4741600</u> | 4 | Suburban Residential WS WD | | | X | | | | |

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

| | | | | | | | | | | | |
|---|----------|--------------------------|----|------------------------------|--|--|---|--|--|---|--|
| Brockton Crescent Street | 0320-003 | 333300 <u>4660400</u> | 10 | Center City Industrial | | | | | | X | |
| Easton-North 300 Main St. Post Office | 0535-001 | 327050 <u>4659170</u> | 5 | Rural Near Urban WS WD | | | X | | | | |

II. PUBLIC SITE DIRECTORY - 1986

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|-----------------------|----------|----------------------------|-------------------|-----------------|-----------------------|----|----------------|-----------------|-----|----|------------------|
| | | | | | SO ₂ | CO | O ₃ | NO ₂ | TSP | Pb | PM ₁₀ |

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119) (Cont.)

| | | | | | | | | | | | |
|--|----------|---------------------|----|-------------------------------------|---|--|---|--|--|---|--|
| Quincy Hancock St., Atlantic Fire Station | 1880-007 | 332400 4682100 | 3 | Suburban Residential | | | | | | X | |
| Sudbury Watertown Rd. Natl. Wildlife | 2196-001 | 303350 4695100 | 5 | Rural Agricultural WS WD Temp | | | X | | | | |
| Watertown Victory Field | 2380-005 | 3203100 46935000 | 4 | Center City Residential | X | | | | | | |
| Woburn Pleasant St. Court House | 2620-002 | 323000 4705000 | 12 | Suburban Commercial | | | | | | X | |

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

| | | | | | | | | | | | |
|--|----------|-------------------|---|----------------------------------|---|---|---|---|---|---|---|
| Lawrence High St. Storrow Park | 1000-005 | 342220 4730590 | 4 | Center City Residential | X | | X | X | X | | X |
| Lowell 35 YMCA Drive | 1080-006 | 310370 4722640 | 7 | Center City Commercial | | | | | X | X | |
| Lowell Old City Hall Merrimack St. | 1080-007 | 310400 4723800 | 5 | Center City Commercial | | X | | | | | |
| Newburyport NWR H Quarters Plum Island | 1520-003 | 351300 4741600 | 4 | Suburban Residential WS WD | | | X | | | | |

SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)

| | | | | | | | | | | | |
|---|----------|-------------------|----|------------------------------|--|--|---|--|--|---|--|
| Brockton Crescent Street | 0320-003 | 333300 4660400 | 10 | Center City Industrial | | | | | | X | |
| Easton-North 300 Main St. Post Office | 0535-001 | 327050 4659170 | 5 | Rural Near Urban WS WD | | | X | | | | |

II. PUBLIC SITE DIRECTORY - 1986 (Cont.)

| CITY SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | | |
|---|----------|----------------------------|-------------------|---|-----------------------|----|----|-----|-----|----|------|
| | | | | | SO2 | CO | O3 | NO2 | TSP | Pb | PM10 |
| SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120) (Cont.) | | | | | | | | | | | |
| Fairhaven Leroy Wood School | 0570-002 | 343330 4610800 | 4 | Suburban Residential WS WD | X | | X | | | | |
| Fall River 165 Bedford St. | 0580-001 | 321000 4618000 | 15 | Center City Commercial | | | | | | X | |
| Fall River Globe St. | 0580-004 | 319700 4616900 | 5 | Center City Commercial WS WD Temp | X | | | X | | | |
| New Bedford 25 Water St. YMCA | 1500-004 | 3395000 46101100 | 16 | Center City Commercial | | | | | | X | |

II. PRIVATE SITE DIRECTORY - 1986

| SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | |
|--|----------|----------------------------|-------------------|-----------------|-----------------------|-----------------|-----|-----|-----|------|
| | | | | | SO ₂ | SO ₄ | W/S | W/D | TSP | TEMP |
| PIONEER VALLEY AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Chicopee Grattan & Meadow | 0400-006 | 697069 4672615 | 5 | Suburban | | X | | | X | |
| Hadley Russell St. Hopkin Academy | 0789-001 | 698398 4690214 | 3 | Rural | X | | | | | |
| Hadley Summit Hse, Mt. Holyoke | 0789-002 | 629160 4685971 | 5 | Rural | X | | | | | |
| Holyoke Mt. Tom Power Plant | 0860-005 | 697554 4683012 | 3 | Rural | X | | X | X | | |
| Holyoke Chmura Pool, Anniversary Park | 0860-010 | 697200 4675680 | 3 | Center City | X | | X | X | | |
| Northampton Elm St. Smith College | 1600-003 | 694660 4687790 | 11 | Center City | | X | | | X | |

II. PRIVATE SITE DIRECTORY - 1986

| SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | |
|---|----------|----------------------------|-------------------|-----------------|-----------------------|-----|-----|-----|-----|------|
| | | | | | SO2 | SO4 | W/S | W/D | TSP | TEMP |
| PIONEER VALLEY AIR QUALITY CONTROL REGION (Cont.) | | | | | | | | | | |
| South Hadley Pine St. Sub- Station | 2126-002 | 699012 4679687 | 3 | Suburban | X | | | | | |
| South Hadley 23 Granview Street | 2126-003 | 699400 4676600 | 3 | Suburban | X | | X | X | | |
| Springfield Longhill Sub- Station | 2160-009 | 700193 4661928 | 6 | Center City | X | X | | | X | |
| Springfield Carew St. Sub-Station | 2160-010 | 699855 4666415 | 4 | Suburban | X | | | | | |
| Springfield Civic Center Rooftop | 2160-012 | 699462 4663692 | 21 | Center City | | X | | | X | |
| Springfield Rose St. & Page Blvd. | 2160-013 | 702346 46683460 | 5 | Center City | | X | | | X | |
| W. Springfield Agawam Ave. Power Plant | 2475-002 | 698639 4662867 | 3 | Center City | X | | X | X | | |
| W. Springfield Agawam Ave. Base Station | 2475-004 | 723554 4205400 | 5 | Center City | X | | | | | |
| W. Springfield Agawam Ave. #2 | 2475-005 | 699100 4662800 | 5 | Center City | X | | | | | |
| W. Springfield Agawam Ave. #3 | 2475-006 | 699100 4662750 | 5 | Center City | X | | | | | |

II. PRIVATE SITE DIRECTORY - 1986

| SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS SAMPLED | | | | | |
|--|----------|----------------------------|-------------------|-----------------|-----------------------|-----|-----|-----|-----|------|
| | | | | | SO2 | SO4 | W/S | W/D | TSP | TEMP |
| METROPOLITAN BOSTON AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Beverly E. Lothrop St.- Central Cemetery | 0220-002 | 346600 4712400 | 3 | Center City | X | | | | | X |
| Boston 476 Atlantic Ave. | 0240-018 | 330760 4690790 | 3 | Center City | X | X | | | | X |
| Boston Long Island | 0240-019 | 337595 4686595 | 5 | Rural | X | X | X | X | | X |
| Boston Dewar St. Dorchester | 0240-020 | 330548 4685952 | 6 | Center City | X | X | X | X | | X |
| Boston Breman St. E. Boston | 0240-021 | 332696 4693440 | 3 | Center City | X | X | X | X | | X |
| Danvers 154 Andover St. | 0480-003 | 338200 4713300 | - | Suburban | X | | X | X | | X |
| Lynn 436 Lynnway St. GECO | 1100-003 | 339171 4701463 | - | Center City | X | | X | X | | X |
| Marblehead Green St. | 1160-003 | 347395 4707922 | 3 | Suburban | X | | | | | X |
| Peabody Meadow Pond - Glen Rd. | 1780-004 | 341340 4708630 | 3 | Suburban | X | | X | X | | |
| Peabody Fox Hill - Perkins St. Playground | 1780-005 | 341130 4709640 | 3 | Suburban | X | | X | X | | |
| Salem Fort Ave. Power Transm. Lines NEPC | 1980-004 | 345900 4710100 | 3 | Suburban | | | X | X | | |
| | | | | | | | | | | X |

X

II. PRIVATE SITE DIRECTORY - 1986

| SITE LOCATION | SAROAD # | UTM COORD EAST NORTH | REC HGT (M) | STATION TYPE | POLLUTANTS | | | | | |
|---------------|----------|----------------------------|-------------------|-----------------|----------------------------|-----------------|-----|-----|-----|------|
| | | | | | SAMPLED SO ₂ | SO ₄ | W/S | W/D | TSP | TEMP |

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (Cont.)

| | | | | | | | | | | |
|--|----------|-------------------|----|----------|---|---|---|---|---|--|
| Sherborn Perry St. Power Lines | 2042-001 | 302200 4681200 | 2 | Rural | X | X | X | X | X | |
| Stoneham Hill St. Hillside Garden Apts. | 2180-001 | 326462 4704385 | 12 | Suburban | X | | X | X | | |
| Wellesley Whitin Obs. Wellesley College | 2420-001 | 310150 4684780 | 4 | Suburban | X | | | | X | |

SOUTHEAST MASSACHUSETTS AIR QUALITY CONTROL REGION

| | | | | | | | | | | |
|---|----------|-------------------|----|-------------|---|--|---|---|---|---|
| Fall River Globe & Wilcox | 0580-010 | 318960 4617230 | 3 | Center City | X | | | | | |
| Fall River Manton & Second Street | 0580-014 | 320020 4617400 | 30 | Urban | | | | | X | |
| Fall River Stanley St. | 0580-036 | 322250 4620050 | 4 | Center City | X | | | | X | |
| Swansea Sharps Lot Road | 2230-001 | 317300 4624600 | 3 | Suburban | X | | X | X | X | X |

MERRIMACK VALLEY AIR QUALITY CONTROL REGION

| | | | | | | | | | | |
|--|----------|---|---|---|---|--|---|---|--|--|
| Haverhill Borman St. Nettle School | 0840-002 | - | - | - | X | | X | X | | |
|--|----------|---|---|---|---|--|---|---|--|--|

III. SAMPLING RESULTS FOR AIR QUALITY DATA

A. SULFUR DIOXIDE (SO₂)

1. Sampling Method

The instrumental method used to analyze continuous SO₂ concentrations is pulse fluorescent. In the pulse fluorescent method, SO₂ molecules are excited by ultra-violet light. In the process, the molecules emit distinctive light waves which vary in intensity according to the SO₂ concentration. The intensity is then measured to find specific SO₂ concentrations. The sampling method meets EPA equivalency requirements in 40CFR 50.1 (1981).

2. Summary of Data

In 1986, 17 SO₂ monitors were in the state-operated network (Figure 3). All of these sites operated at 94 percent or greater data capture. No violations of the National Ambient Air Quality Standards (NAAQS) for SO₂ were recorded in 1986. Table 5 shows that the highest annual average (42 ug/M³) was in the Metropolitan Boston urban area (0240-002). In 1986, data from privately operated 29 SO₂ monitors was quality assured and submitted to DAQC (Figure 4). 27 of these sites operated at 75 percent data capture or greater. No violations of the NAAQS were recorded. Table 6 shows that the highest annual average (42 ug/M³) was in the Springfield area (2160-009, 2160-010).

(3) TABLE 5 - PUBLIC SITES

1986 SULFUR DIOXIDE MONITORING RESULTS

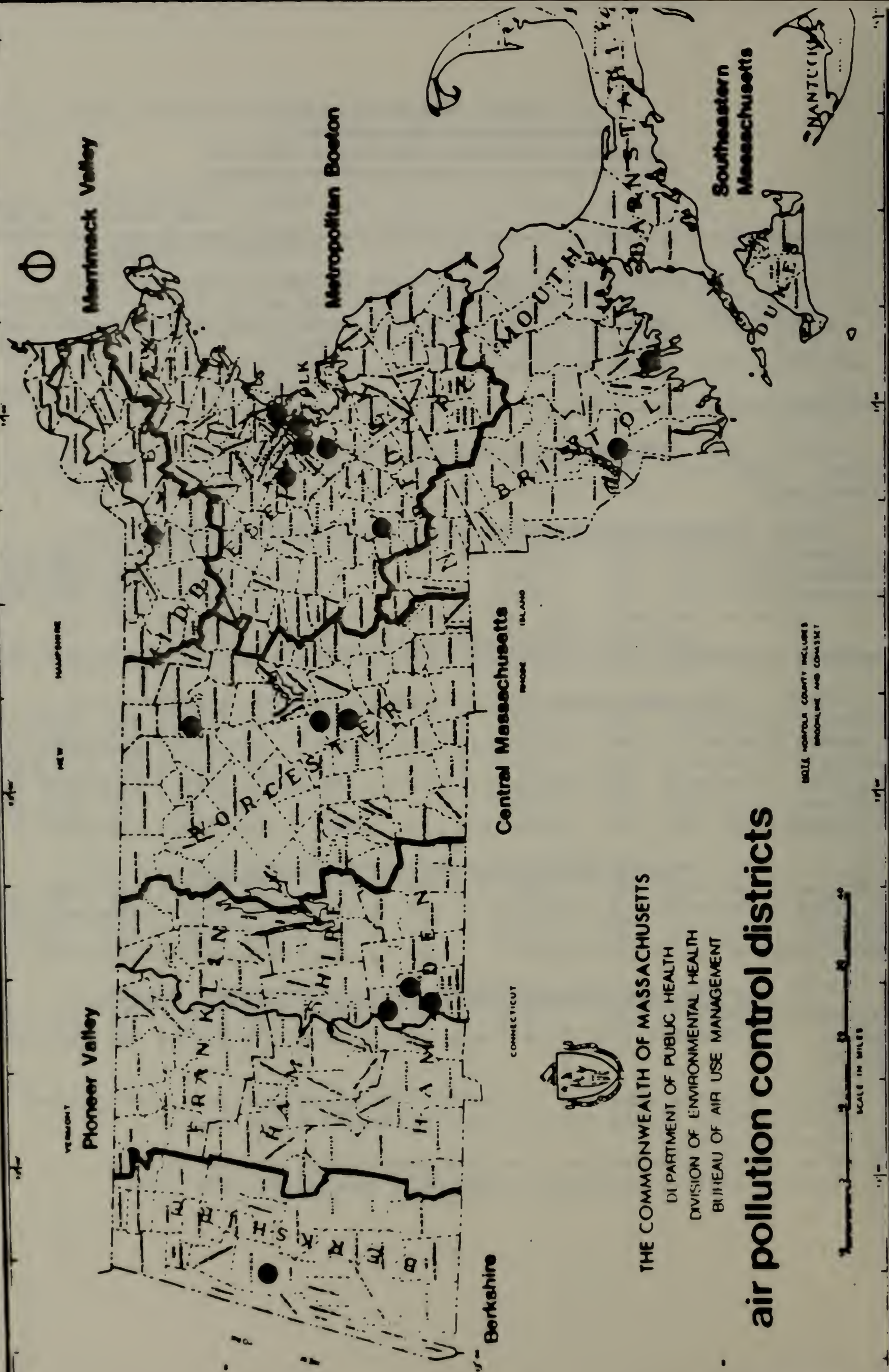
SO₂ units: ug/m³

| Daily | | | | | | | | | | |
|---|--------------|--------------------|-----------------------|--------------------|--------------------------|-----|------------------------|-----|-----------------------|-----|
| City | Saroad Site# | Instru-ment Method | Number of Hourly obs. | Annual Arith. Mean | Maximum 24 hr. obs Block | | Maximum 3 Hr obs Block | | Maximum 1Hr obs Block | |
| | | | | | 1st | 2nd | 1st | 2nd | 1st | 2nd |
| BERKSHIRE AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Pitts-field | 1800-007 | 20 | 7781 | 37 | 110 | 81 | 202 | 162 | 375 | 241 |
| CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Fitchburg | 0620-010 | 20 | 1146 | ** | 139 | 102 | 249 | 217 | 309 | 254 |
| Worcester | 2640-019 | 20 | 8502 | 18 | 87 | 81 | 139 | 139 | 202 | 152 |
| Worcester | 2640-020 | 20 | 8549 | 24 | 139 | 102 | 236 | 220 | 322 | 322 |
| MERRIMACK VALLEY AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Lawrence | 1000-005 | 20 | 8327 | 26 | 121 | 110 | 212 | 210 | 328 | 301 |
| METROPOLITAN BOSTON AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Boston | 0240-002 | 20 | 7764 | 42 | 147 | 141 | 377 | 364 | 519 | 419 |
| Boston | 0240-015 | 20 | 1749 | ** | 105 | 100 | 173 | 173 | 204 | 194 |
| Boston | 0240-021 | 20 | 8141 | 37 | 113 | 113 | 236 | 202 | 377 | 354 |
| Chelsea | 0380-003 | 20 | 8238 | 31 | 121 | 121 | 275 | 275 | 529 | 309 |
| Medfield | 1210-001 | 20 | 997 | ** | 55 | 50 | 86 | 84 | 100 | 100 |
| Watertown | 2380-005 | 20 | 8253 | 21 | 102 | 76 | 314 | 215 | 367 | 364 |
| PIONEER VALLEY AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Chicopee | 0400-008 | 20 | 1159 | ** | 110 | 110 | 207 | 186 | 288 | 262 |
| Sprngfld. | 2160-009 | 20 | 8323 | 37 | 126 | 118 | 304 | 299 | 485 | 480 |
| Sprngfld. | 2160-015 | 20 | 7751 | 31 | 176 | 152 | 236 | 233 | 275 | 273 |
| Ware | 2360-002 | 20 | 7972 | 13 | 86 | 66 | 157 | 128 | 173 | 170 |
| SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION | | | | | | | | | | |
| Fairhaven | 0570-002 | 20 | 1018 | ** | 68 | 66 | 149 | 115 | 204 | 162 |
| Fall River | 0580-004 | 20 | 7498 | 24 | 99 | 89 | 197 | 189 | 341 | 338 |

* Sulfur dioxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

** When total observations are less than 6,250, sample size is insufficient to represent sound data results for the year.

FIGURE 3: Continuous Air Sampling Network Sulfur Dioxide - 1986 - Public Sites



(5) TABLE 6 - PRIVATE SITES
1986 SULFUR DIOXIDE MONITORING RESULTS

SO₂ units: ug/m³

| City | Saroad Site# | Instrument Method | Number of Hourly obs. | Annual Arith. Mean | Daily | | | | | |
|---|--------------|-------------------|-----------------------|--------------------|---------------------------|-----|--------------------------|------|--------------------|------|
| | | | | | Maximum 24 hr. obs. Block | | Maximum 3 Hr. obs. Block | | Maximum 1 Hr. obs. | |
| | | | | | 1st | 2nd | 1st. | 2nd. | 1st. | 2nd. |
| <u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION</u> | | | | | | | | | | |
| Beverly | 0220-002 | 20 | 8643 | 18 | 94 | 81 | 176 | 168 | 194 | 186 |
| Boston | 0240-018 | 20 | 8566 | 37 | 141 | 110 | 293 | 257 | 359 | 351 |
| Boston | 0240-019 | 20 | 8581 | 21 | 102 | 86 | 264 | 196 | 503 | 493 |
| Boston | 0240-020 | 20 | 8515 | 26 | 118 | 105 | 233 | 191 | 307 | 286 |
| Boston | 0240-021 | 20 | 8629 | 31 | 123 | 97 | 223 | 194 | 372 | 346 |
| Danvers | 0480-003 | 20 | 4297** | 21* | 68 | 66 | 278 | 238 | 467 | 385 |
| Lynn | 1100-003 | 91 | 8566 | 31 | 246 | 196 | 456 | 445 | 663 | 595 |
| Marblehead | 1160-003 | 20 | 8670 | 23 | 84 | 81 | 183 | 168 | 333 | 320 |
| Peabody | 1780-004 | 20 | 8463 | 30 | 89 | 68 | 141 | 134 | 359 | 296 |
| Peabody | 1780-005 | 20 | 8562 | 34 | 113 | 113 | 215 | 212 | 404 | 349 |
| Sherborn | 2042-001 | 13 ⁺ | | | | | | | | |
| Stoneham | 2180-001 | 20 | 8549 | 31 | 314 | 128 | 707 | 639 | 949 | 930 |
| Wellesley | 2420-001 | 20 | 7855 | 18 | 102 | 102 | 228 | 196 | 257 | 236 |
| <u>PIONEER VALLEY AIR QUALITY CONTROL REGION</u> | | | | | | | | | | |
| Hadley | 0789-001 | 20 | 7940 | 30 | 100 | 84 | 231 | 217 | 508 | 433 |
| Hadley | 0789-002 | 20 | 7906 | 39 | 160 | 118 | 233 | 215 | 511 | 508 |
| Holyoke | 0860-005 | 20 | 7917 | 26 | 100 | 73 | 183 | 178 | 302 | 270 |
| Holyoke | 0860-010 | 20 | 8262 | 26 | 154 | 110 | 212 | 196 | 265 | 252 |
| S. Hadley | 2126-002 | 20 | 7876 | 31 | 131 | 94 | 199 | 196 | 490 | 349 |
| S. Hadley | 2126-003 | 20 | 8357 | 16 | 115 | 81 | 170 | 149 | 210 | 197 |
| Springfld | 2160-009 | 20 | 8332 | 42 | 141 | 136 | 325 | 265 | 459 | 388 |
| Springfld | 2160-010 | 20 | 8139 | 42 | 170 | 162 | 299 | 293 | 409 | 354 |
| W.Springfield | 2475-002 | 20 | 8388 | 37 | 181 | 162 | 723 | 516 | 1166 | 668 |
| W.Springfield | 2475-004 | 20 | 8381 | 39 | 136 | 123 | 283 | 259 | 548 | 362 |
| W.Springfield | 2475-005 | 20 | 8386 | 39 | 141 | 123 | 220 | 207 | 477 | 315 |
| W.Springfield | 2475-006 | 20 | 8368 | 39 | 162 | 128 | 346 | 259 | 516 | 498 |

⁺Data for this site is presently under review.

(5) TABLE 6 - PRIVATE SITES (Cont.)
1986 SULFUR DIOXIDE MONITORING RESULTS

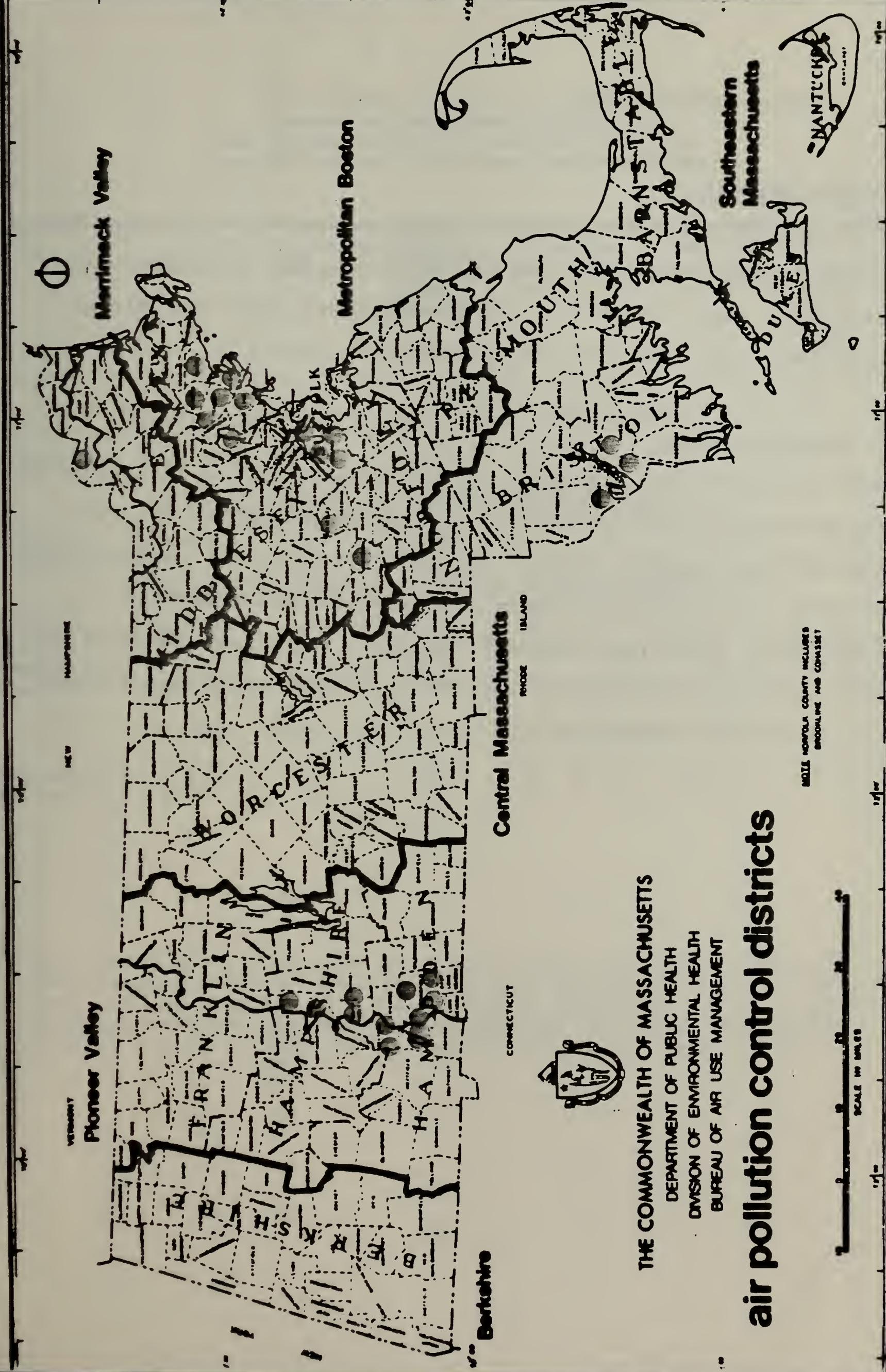
SO₂ units: ug/m³

| Daily | | | | | | | | | | |
|--|--------------|-------------------|-----------------------|--------------------|---------------------------|-----|--------------------------|------|--------------------|------|
| City | Saroad Site# | Instrument Method | Number of Hourly obs. | Annual Arith. Mean | Maximum 24 Hr. obs. Block | | Maximum 3 Hr. obs. Block | | Maximum 1 Hr. obs. | |
| | | | | | 1st | 2nd | 1st. | 2nd. | 1st. | 2nd. |
| <u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u> | | | | | | | | | | |
| Haverhill | 0840-002 | 20 | 7727 | 26 | 104 | 97 | 202 | 187 | 346 | 330 |
| <u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)</u> | | | | | | | | | | |
| Fall River | 0580-010 | 20 | 8684 | 27 | 175 | 167 | 369 | 319 | 401 | 388 |
| Fall River | 0580-036 | 20 | 5054** | 23* | 96 | 84 | 201 | 155 | 390 | 283 |
| Swansea | 2230-001 | 20 | 8630 | 17 | 110 | 104 | 577 | 401 | 739 | 721 |

* Annual Arithmetic Mean based on less than 75% data capture.

** When total observations are less than 6,250, sample size is insufficient to represent sound data results for the year. Sulfur dioxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

FIGURE 4: Continuous Air Sampling Network Sulfur Dioxide: 1986 - Private Sites



THE COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF PUBLIC HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
BUREAU OF AIR USE MANAGEMENT

air pollution control districts

B. CARBON MONOXIDE (CO)

1. Sampling Method

DAQC uses non-dispersive infrared (NDIR) analyzers for CO detection. These analyzers employ a short cell NDIR detection principle coupled with water vapor subtraction. This methodology meets equivalency requirements published by EPA in 40CFR 50.8, (1981).

2. Summary of Data

DAQC operated eight CO monitors in 1986 (Figure 5). No violations of the one-hour CO National Ambient Air Quality Standards (40 mg/m^3) (NAAQS) were recorded in 1986. Table 7 shows that the maximum hourly CO value was 25 mg/M^3 at Boston (0240-002) and at Worcester (2640-020). The 8-hour standard (10 mg/m^3) was exceeded 6 times in 1986. Worcester (2640-020) recorded the highest eight-hour average concentration (17 mg/M^3).

(3) TABLE 7 - PUBLIC SITES

1986 CARBON MONOXIDE MONITORING RESULTS

CO Units: mg/M₃

| City | Saroad Site # | Instrument Method | Number of Hourly obs. | Maximum | | Maximum | | # of 8 hr aver- ages above 10 |
|------|------------------|----------------------|--------------------------------|-------------|--------------|-------------|-------------|--|
| | | | | 1st 1hr. | 2nd 1 hr. | 1st 8 hr | 2nd 8 hr | |

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)

| | | | | | | | | |
|-----------|----------|----|------|----|----|----|---|---|
| Worcester | 2640-020 | 11 | 8615 | 25 | 22 | 17 | 8 | 1 |
|-----------|----------|----|------|----|----|----|---|---|

MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)

| | | | | | | | | |
|--------|----------|----|------|----|----|---|---|----|
| Lowell | 1080-007 | 11 | 5288 | 14 | 13 | 8 | 8 | ** |
|--------|----------|----|------|----|----|---|---|----|

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

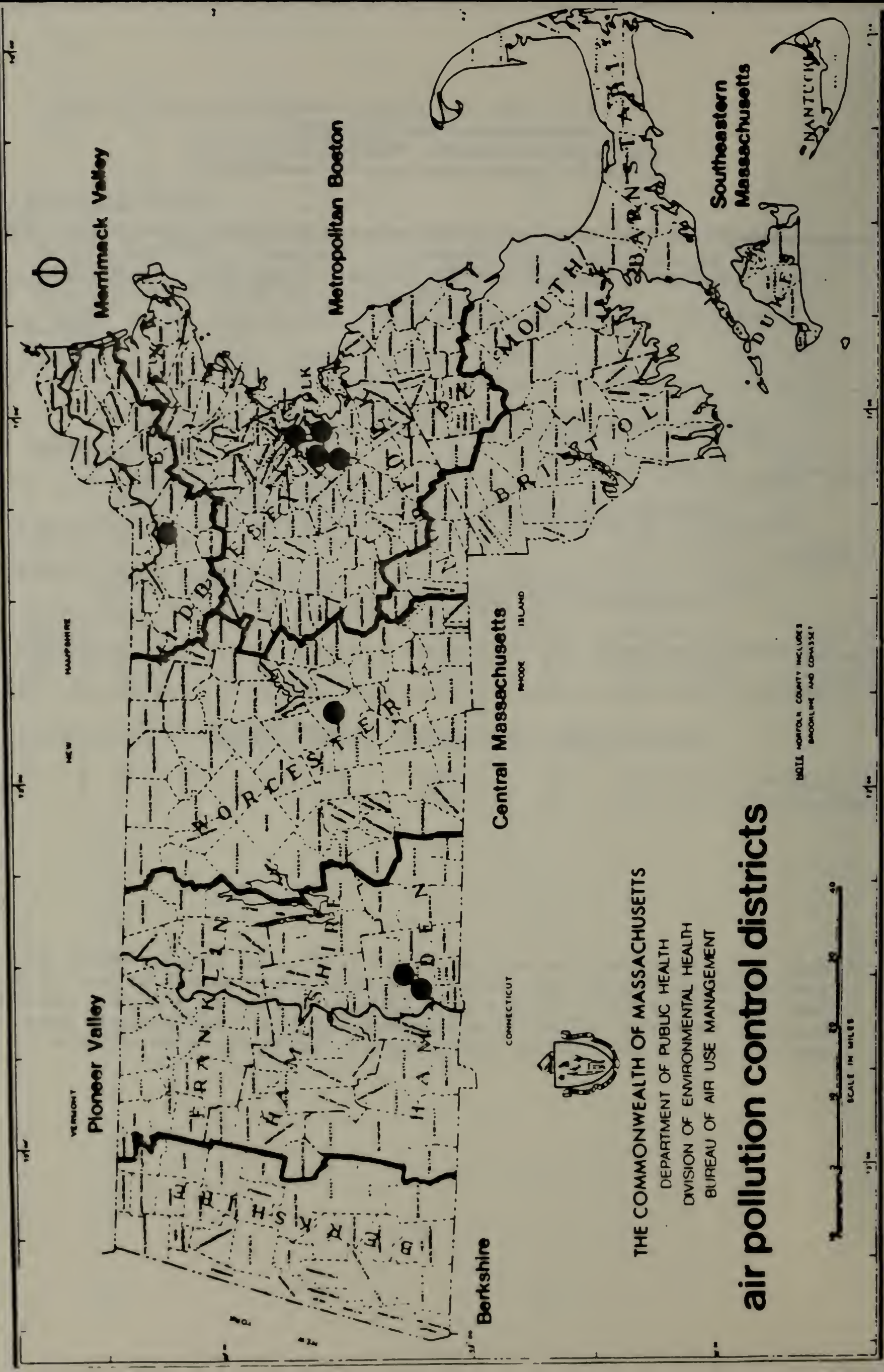
| | | | | | | | | |
|--------|----------|----|------|----|----|----|----|----|
| Boston | 0240-002 | 11 | 8414 | 12 | 12 | 7 | 7 | 0 |
| Boston | 0240-015 | 11 | 1040 | 6 | 6 | 5 | 5 | ** |
| Boston | 0240-021 | 11 | 8405 | 9 | 8 | 7 | 6 | 0 |
| Boston | 0240-022 | 11 | 7934 | 25 | 18 | 12 | 12 | 3 |

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

| | | | | | | | | |
|-------------|----------|----|------|----|----|----|----|---|
| Springfield | 2160-007 | 11 | 8696 | 18 | 17 | 13 | 12 | 2 |
| Springfield | 2160-014 | 11 | 8383 | 10 | 9 | 5 | 5 | 0 |

** When total observations are less than 6,570, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site. Carbon monoxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

FIGURE 5: Continuous Air Sampling Network - Carbon Monoxide - 1986 - Public Sites



C. OZONE (O₃)

1. Sampling Method

The chemiluminescence detection principle and the ultraviolet photometric analyzer method are used in the continuous measurement for ozone. In the chemiluminescence method, the ozone reacts chemically with ethylene gas, which emits light. The intensity of the emitted light is proportional to the amount of ambient ozone. In the ultraviolet method, the ultraviolet photometer gauges ozone concentrations by measuring the attenuation of light from ozone in the adsorption cell at a wave length of 254 nanometers. The concentration of ozone is directly related to the magnitude of attenuation. Both methodologies meet equivalency requirements published by EPA 40CFR 50.9 (1981).

The ozone season covers seven months of monitoring from April to October.

2. Summary of Data

DAQC operated eleven (11) ozone monitoring stations in 1986 (Figure 6). All of these sites operated at 94 percent or greater data capture. At seven stations the .125 parts per million 1-hour standard was exceeded. Table 8 shows that the maximum ozone value was .151 ppm at Fairhaven (0570-002).

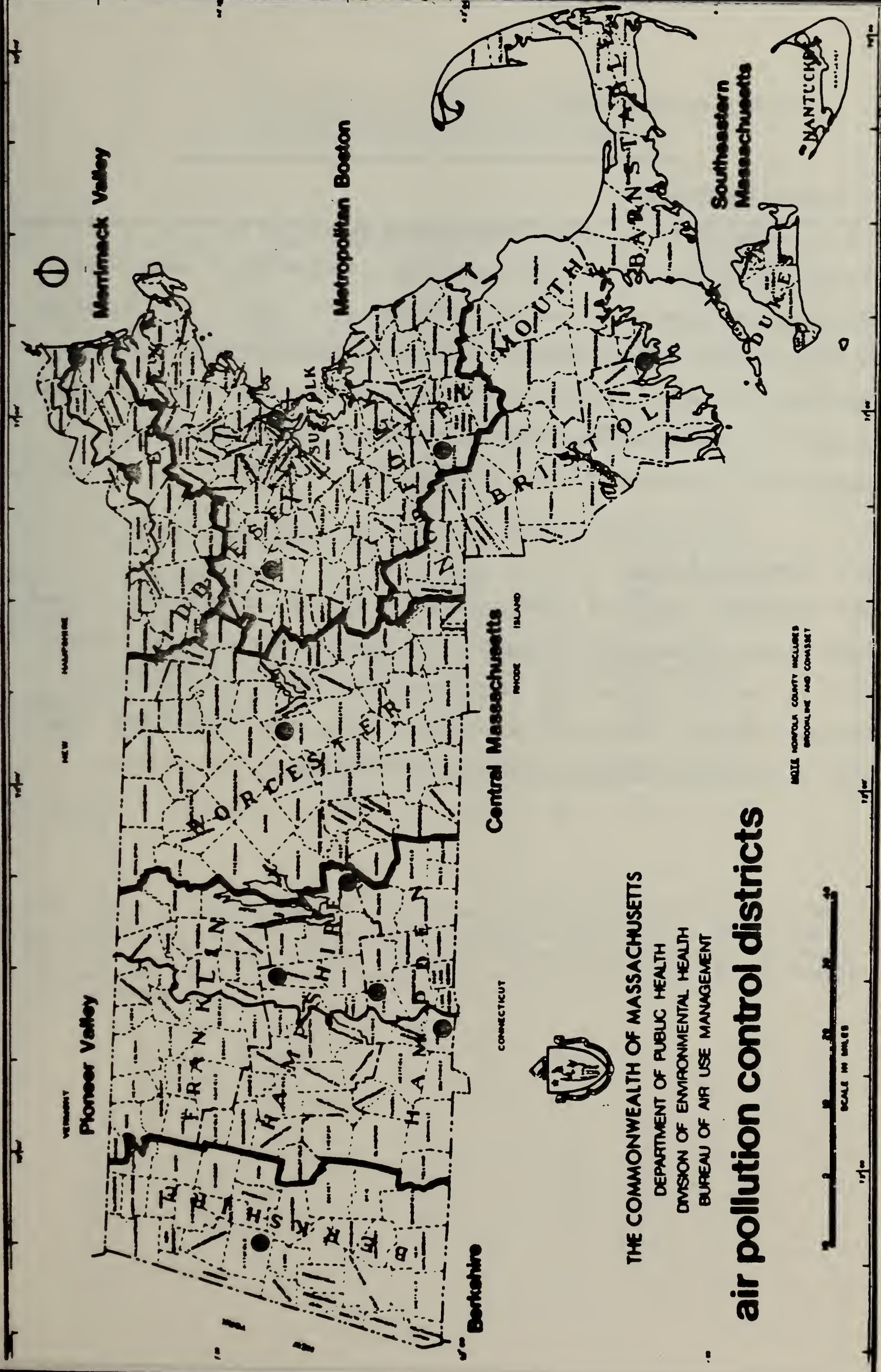
(3)TABLE 8 - PUBLIC SITES
1986 OZONE MONITORING RESULTS

O₃ units = ppm

| City | Saroad Site # | Instrument Method | # of obs. | Maximum 1 Hr. Obs. | | | Values = > .125 measured for Daily Max |
|--|---------------|-------------------|-----------|--------------------|------|------|--|
| | | | | 1st | 2nd. | 3rd. | |
| <u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u> | | | | | | | |
| Worcester | 2640-019 | 11 | 4945 | .097 | .096 | .092 | 0 |
| <u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u> | | | | | | | |
| Chelsea | 0380-003 | 11 | 8218 | .125 | .123 | .103 | 1 |
| Sudbury | 2196-001 | 11 | 4379 | .100 | .090 | .089 | 0 |
| <u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u> | | | | | | | |
| Lawrence | 1000-005 | 11 | 4736 | .103 | .099 | .096 | 0 |
| Newburyport | 1520-003 | 11 | 5002 | .133 | .128 | .126 | 3 |
| <u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u> | | | | | | | |
| Agawam | 0030-003 | 11 | 4818 | .127 | .125 | .113 | 2 |
| Amherst | 0060-002 | 14 | 5023 | .130 | .122 | .107 | 1 |
| Chicopee | 0400-008 | 11 | 8648 | .136 | .135 | .118 | 2 |
| Ware | 2360-002 | 14 | 8156 | .131 | .128 | .127 | 3 |
| <u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)</u> | | | | | | | |
| Easton | 0535-001 | 11 | 4731 | .114 | .107 | .103 | 0 |
| Fairhaven | 0570-002 | 11 | 4841 | .151 | .138 | .138 | 3 |

** When total observations are less than 3,852 the sample cannot be guaranteed to contain the actual maximum concentration value for the year. An observation is a single hourly reading at a site; 100 percent data capture during the 4/1 to 10/31 ozone season represents 5,136 observations at each monitor.

Figure 6: Continuous Air Sampling Network Ozone - 1986 - Public Sites



D. NITROGEN DIOXIDE (NO₂)

1. Sampling Method

NO₂ is measured by the chemiluminescence detection principle. In this method, nitric oxide (NO) and oxides of nitrogen (NO_x) react with ozone and the resultant chemical products emit light. The intensity of this light is proportional to the concentrations of NO_x and NO. The electronically calibrated difference between NO_x and NO is equal to the NO₂ concentration. This methodology meets equivalency requirements published by EPA in 40CFR 50.11 (1981).

2. Summary of Data

DAQC operated eight NO₂ monitoring sites in 1986 (Figure 7). All of these sites operated at 93 percent or greater data capture. There were no recorded violations of the National Ambient Air Quality Standard (NAAQS) for NO₂. Table 9 shows that the highest NO₂ level (397 ug/M³) was recorded in Boston (0240-002).

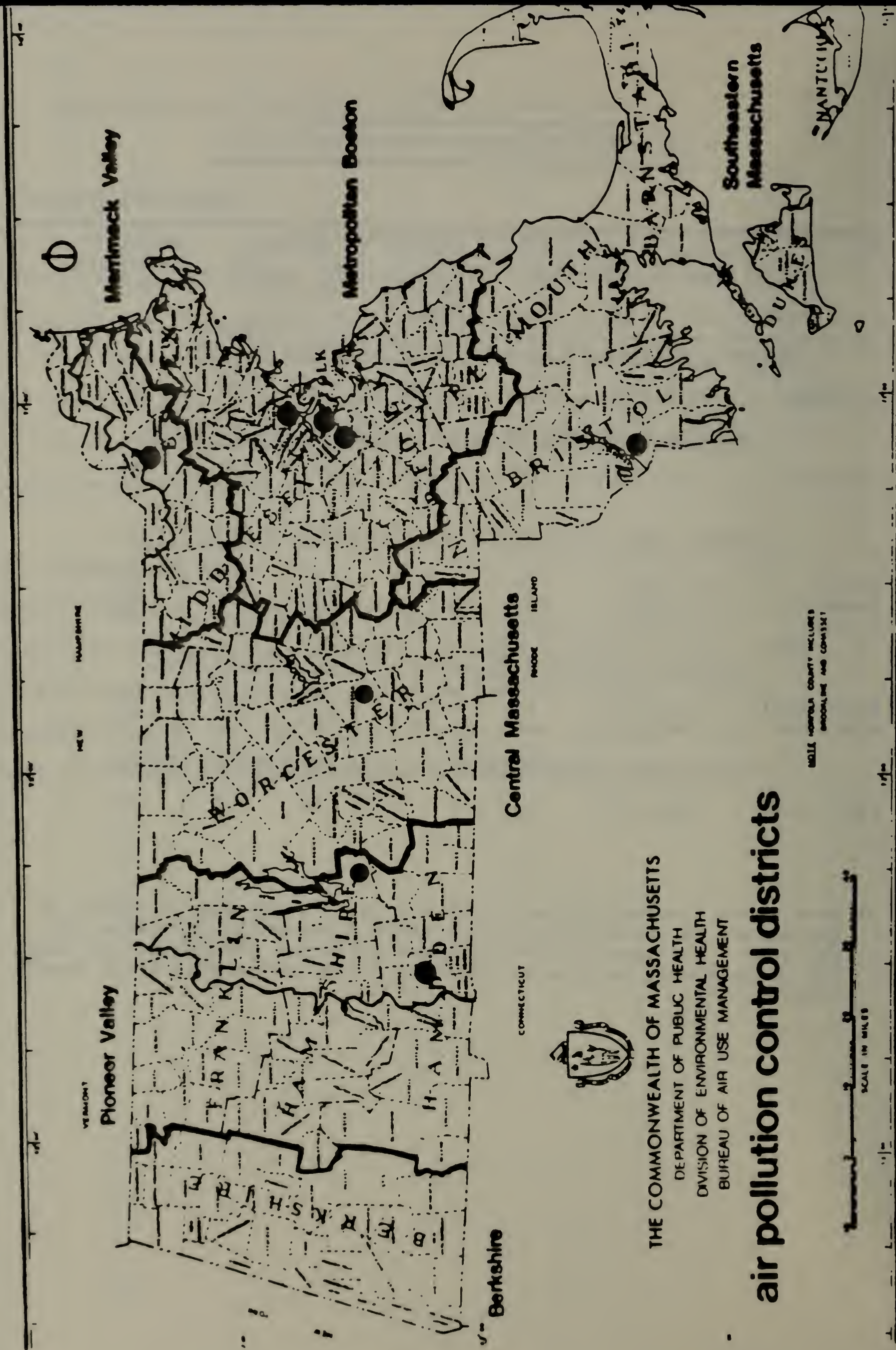
(3) TABLE 9 - PUBLIC SITES
1986 NITROGEN DIOXIDE MONITORING RESULTS

NO₂ units: ug/M³

| City | Saroad Site # | Instrument Method | Number of Hourly obs. | Maximum | | Annual Arithmetic Mean |
|---|------------------|----------------------|--------------------------------|-------------|-------------|------------------------------|
| | | | | 1st hour | 2nd hour | |
| <u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u> | | | | | | |
| Worcester | 2640-020 | 14 | 3495 | 239 | 207 | ** |
| <u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u> | | | | | | |
| Lawrence | 1000-005 | 14 | 1324 | 229 | 224 | ** |
| <u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u> | | | | | | |
| Boston | 0240-002 | 14 | 7208 | 397 | 361 | 62 |
| Boston | 0240-021 | 14 | 7355 | 376 | 301 | 64 |
| Chelsea | 0380-003 | 14 | 7865 | 273 | 241 | 45 |
| <u>PIONEER VALLEY AIR POLLUTION CONTROL REGION (042)</u> | | | | | | |
| Springfield | 2160-015 | 14 | 8487 | 203 | 203 | 41 |
| Ware | 2360-002 | 14 | 8111 | 389 | 387 | 20 |
| <u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION</u> | | | | | | |
| Fall River | 0580-004 | 14 | 142 | 86 | 83 | ** |

** When total observations are less than 6,570, the sample cannot be guaranteed to contain the actual maximum concentration value for the year. Nitrogen dioxide data are collected throughout the year; 100 percent data capture during this period represents 8,760 hourly observations.

FIGURE 7: Continuous Air Sampling Network Nitrogen Dioxide - 1986 - Public Sites



E. TOTAL SUSPENDED PARTICULATES (TSP)

1. Sampling Method

TSP measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at a rate between 40 to 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. The difference in weight in milligrams is divided by the volume of air passed through, giving a weight per unit volume result, i.e., ug/M³. Upon completion of the TSP (weight/unit volume) calculation, several other physical and chemical tests can be performed upon the collected sample, such as lead and sulfate content. This methodology meets equivalency requirements published by EPA in 40CFR 50.6 (1981).

2. Summary of Data

In 1986, 22 TSP monitors were state-operated. Sixteen had at least 92 percent data capture for 1986. The Quabbin site in Ware (2360-002) was not included due to insufficient data. Only one violation of the Annual Primary Standard of the National Ambient Air Quality Standards (NAAQS) for TSP was recorded (82 ug/M³) at Boston (0240-027). Six exceedances of the 24-hour secondary standard were recorded in Boston and one in Pittsfield.

Sixteen TSP monitors in 1986 were privately operated (Figure 9). One site, Springfield (2160-010) was not incorporated into the report. Only 19 observations were made for the year. No violations of the primary annual NAAQS were recorded. However, fifteen sites had at least 75 percent data capture. Table 11 shows that the highest annual geometric mean (58 ug/M^3) was recorded at Boston (0240-018). Two exceedances of the 24-hour secondary standard were also recorded.

(3) TABLE 10 - PUBLIC SITES

1986 TOTAL SUSPENDED PARTICULATES MONITORING RESULTS

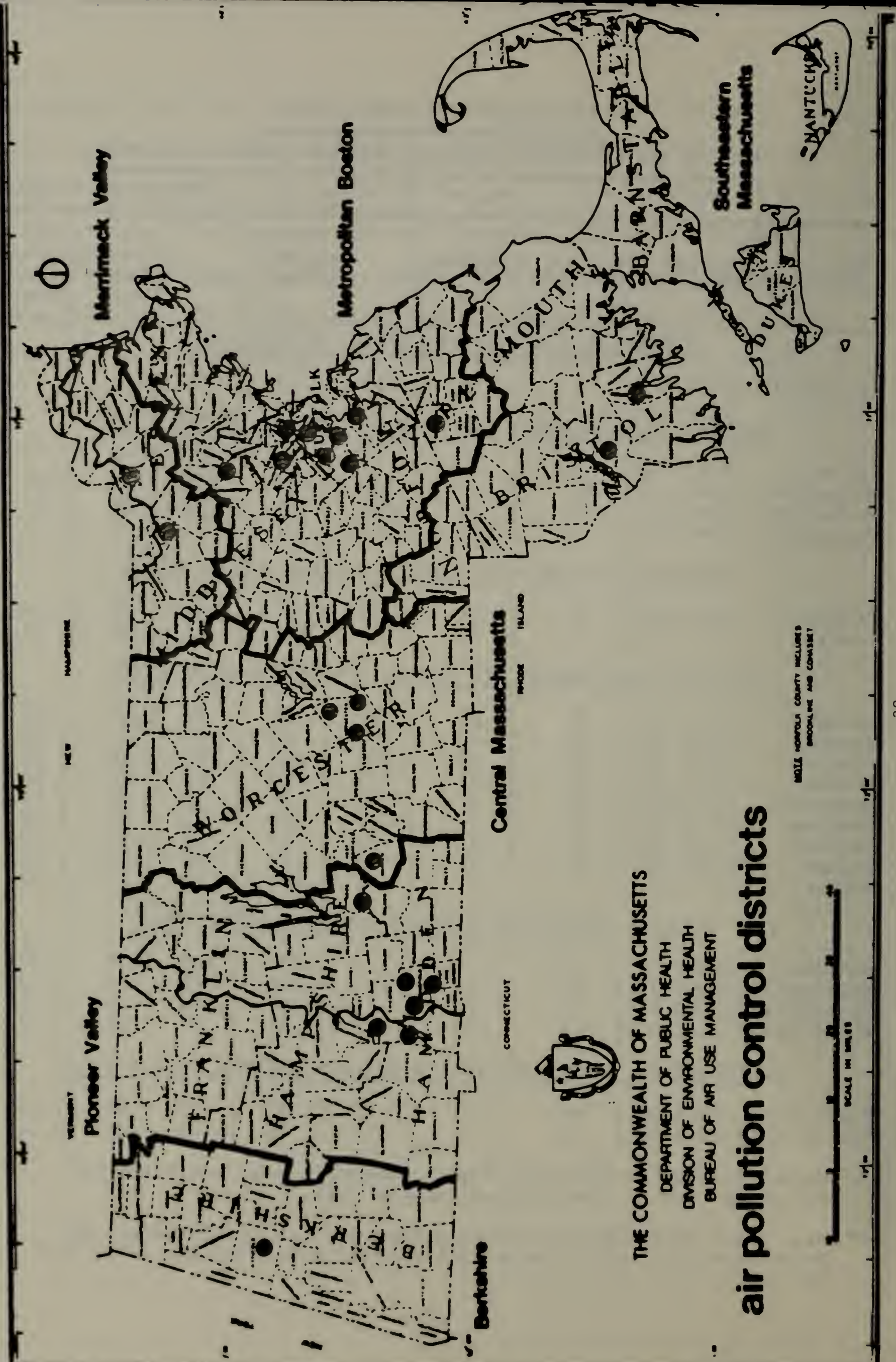
TSP Units: ug/M³

| City | Site# | Number of Obs. | Minimum Obs. | 1st. | Daily Maximum 2nd. | 3rd. | Annual Arith. Mean | Annual Geo. Mean |
|--|----------|----------------------|-----------------|------|--------------------------|------|--------------------------|------------------------|
| <u>BERKSHIRE AIR QUALITY CONTROL REGION (117)</u> | | | | | | | | |
| Pittsfield | 1800-006 | 7 | 18 | 152 | 77 | 75 | * | * |
| <u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u> | | | | | | | | |
| Warren | 2372-001 | 7 | 16 | 37 | 27 | 25 | * | * |
| Worcester | 2640-013 | 60 | 12 | 138 | 131 | 105 | 54 | 48 |
| Worcester | 2640-016 | 60 | 14 | 100 | 94 | 90 | 51 | 47 |
| Worcester | 2640-021 | 7 | 13 | 60 | 57 | 53 | * | * |
| <u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u> | | | | | | | | |
| Lawrence | 1000-005 | 12 | 21 | 58 | 57 | 56 | * | * |
| Lowell | 1080-006 | 55 | 17 | 113 | 101 | 85 | 48 | 45 |
| <u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u> | | | | | | | | |
| Boston | 0240-012 | 56 | 24 | 94 | 88 | 88 | 64 | 61 |
| Boston | 0240-021 | 61 | 13 | 114 | 89 | 86 | 54 | 51 |
| Boston | 0240-024 | 52 | 29 | 220 | 197 | 197 | 79 | 72 |
| Boston | 0240-027 | 58 | 31 | 193 | 159 | 150 | 89 | 82 |
| Brockton | 0320-003 | 61 | 12 | 92 | 77 | 70 | 38 | 35 |
| Chelsea | 0380-003 | 58 | 17 | 98 | 80 | 71 | 42 | 39 |
| Medford | 1220-002 | 61 | 16 | 105 | 85 | 76 | 43 | 39 |
| Quincy | 1880-007 | 55 | 15 | 72 | 71 | 70 | 43 | 41 |
| Woburn | 2620-002 | 61 | 16 | 104 | 103 | 97 | 44 | 39 |
| <u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u> | | | | | | | | |
| Holyoke | 0860-007 | 60 | 8 | 130 | 109 | 100 | 56 | 50 |
| Springfield | 2160-011 | 58 | 25 | 102 | 101 | 92 | 56 | 53 |
| Springfield | 2160-015 | 11 | 12 | 67 | 63 | 60 | * | * |
| W.Springfld | 2475-003 | 60 | 28 | 107 | 91 | 91 | 51 | 47 |
| <u>SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION (120)</u> | | | | | | | | |
| Fall River | 0580-001 | 60 | 22 | 92 | 83 | 73 | 44 | 42 |
| New Bedford | 1500-004 | 59 | 17 | 70 | 63 | 63 | 36 | 34 |

* Annual Arithmetic Mean and Annual Geometric Mean could not be determined due to insufficient sample size.

** When total observations are less than 40, the sample cannot be guaranteed to contain the actual maximum concentration value for the year.

Figure 8: Air Sampling Network Total Suspended Particles - 1986 - Public Sites



(5) TABLE 11 - PRIVATE SITES

1986 TOTAL SUSPENDED PARTICULATES MONITORING RESULTS

TSP Units: ug/M³

| City | Saroad Site# | Number of Obs. | Minimum Obs. | Daily | | 3rd Max Obs. | Annual Arith. Mean | Annual Geo. Mean |
|------|--------------|----------------|--------------|--------------|--------------|--------------|--------------------|------------------|
| | | | | 1st Max Obs. | 2nd Max Obs. | | | |

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

| | | | | | | | | |
|-------------|----------|----|----|-----|-----|-----|----|----|
| Chicopee | 0400-006 | 59 | 8 | 138 | 120 | 99 | 49 | 42 |
| Northampton | 1600-003 | 61 | 7 | 74 | 74 | -- | 36 | 32 |
| Springfield | 2160-009 | 59 | 9 | 86 | 81 | 75 | 39 | 35 |
| Springfield | 2160-012 | 56 | 13 | 104 | 103 | 101 | 44 | 39 |
| Springfield | 2160-013 | 57 | 8 | 111 | 107 | 94 | 43 | 37 |

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

| | | | | | | | | |
|------------|----------|----|----|-----|-----|----|----|----|
| Beverly | 0220-002 | 59 | 10 | 217 | 124 | 80 | 36 | 30 |
| Boston | 0240-018 | 52 | 0 | 170 | 143 | -- | 68 | 58 |
| Boston | 0240-019 | 57 | 0 | 86 | 63 | 48 | 26 | 22 |
| Boston | 0240-020 | 58 | 0 | 87 | 83 | 68 | 37 | 32 |
| Boston | 0240-021 | 58 | 0 | 109 | 79 | 75 | 43 | 37 |
| Danvers | 0480-003 | 40 | 21 | 177 | 124 | 90 | 57 | 51 |
| Marblehead | 1160-003 | 46 | 15 | 76 | 59 | 58 | 32 | 30 |
| Wellesley | 2420-001 | 57 | 10 | 58 | 55 | 49 | 29 | 27 |

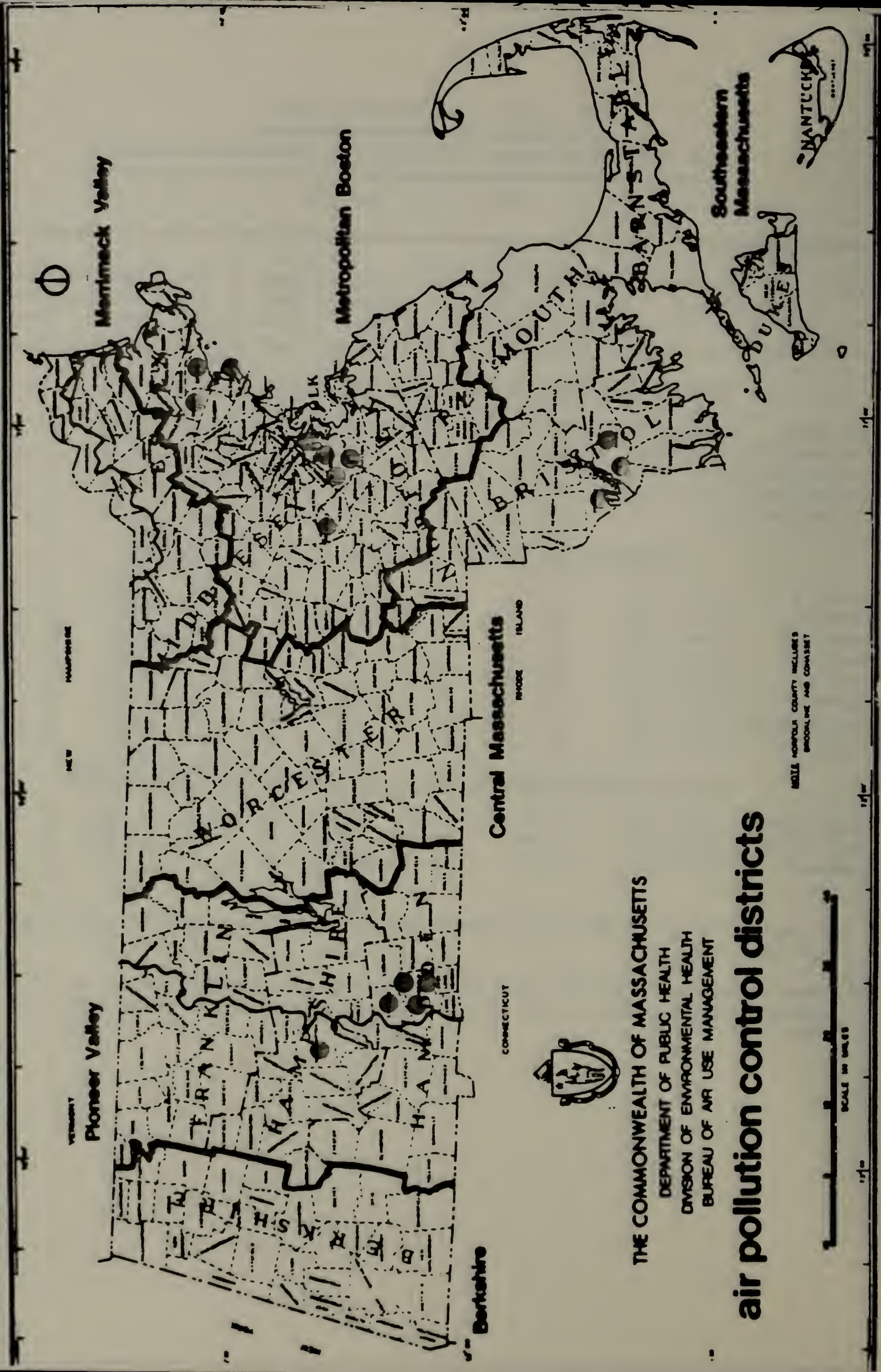
SOUTHEASTERN MASSACHUSETTS AIR QUALITY CONTROL REGION

| | | | | | | | | |
|------------|----------|------|----|----|----|----|-----|-----|
| Fall River | 0580-014 | 57 | 14 | 69 | 64 | 59 | 36 | 34 |
| Fall River | 0580-036 | 35** | 10 | 98 | 71 | 46 | 30* | 26* |
| Swansea | 2230-001 | 54 | 11 | 82 | 61 | 45 | 27 | 25 |

* Annual Arithmetic Mean and Annual Geometric Mean based on less than 75% data capture.

** When total observations are less than 40, the sample cannot be guaranteed to contain the actual maximum concentration value for the year.

FIGURE 9: Air Sampling Network - Total Suspended Particulates - 1986 - Private Sites



F. LEAD (Pb)

1. Sampling Method

Lead measurements are routinely taken using the standard high volume air sampler method every sixth day. In this procedure, air is drawn through a pre-weighed 8"x10" fiberglass filter at a rate between 40 to 60 CFM for a period of 24 hours beginning at midnight. At the conclusion of the sampling, the filter is removed and transported to a laboratory for reweighing. This analysis continues with the filter cut and placed in a nitric acid bath. The solution is then passed through an atomic absorption analyzer. This methodology meets equivalency requirements published in 40 CFR 50.12 (1981).

2. Summary of Data

In 1986, six lead monitors were state-operated (Figure 10). No exceedances of the three-month National Ambient Air Quality Standards (NAAQS) for lead were recorded in 1986. Table 12 and Figure 11 show that the maximum quarterly level occurred in Springfield (2160-007) with an arithmetic mean of .29 ug/M³.

(3)TABLE 12 - PUBLIC SITES
1986 LEAD MONITORING RESULTS

Pb units: ug/M³

| City | Saroad Site# | Instrument Method | No. of Obs. | Daily Maximum Obs. | | Arithmetic Mean Quarter | | | |
|---|--------------|-------------------|-------------|--------------------|-----|-------------------------|-----|-----|-----|
| | | | | 1st | 2nd | 1st | 2nd | 3rd | 4th |
| <u>CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION (118)</u> | | | | | | | | | |
| Worcester | 2640-016 | 92 | 57 | .12 | .12 | .07 | .06 | .06 | .07 |
| <u>MERRIMACK VALLEY AIR QUALITY CONTROL REGION (121)</u> | | | | | | | | | |
| Lowell | 1080-006 | 92 | 53 | .69 | .36 | .17 | .08 | .09 | .11 |
| <u>METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)</u> | | | | | | | | | |
| Boston | 0240-002 | 92 | 52 | .36 | .30 | .19 | .13 | .15 | .15 |
| Boston | 0240-027 | 92 | 59 | .46 | .25 | .11 | .11 | .11 | .11 |
| <u>PIONEER VALLEY AIR QUALITY CONTROL REGION (042)</u> | | | | | | | | | |
| Springfld. | 2160-007 | 92 | 59 | .56 | .55 | .29 | .16 | .23 | .21 |
| Springfld. | 2160-011 | 92 | 58 | .46 | .33 | .17 | .09 | .12 | .13 |

ND: No data available

Figure 10: Air Sampling Network - Lead: 1986 Public Sites

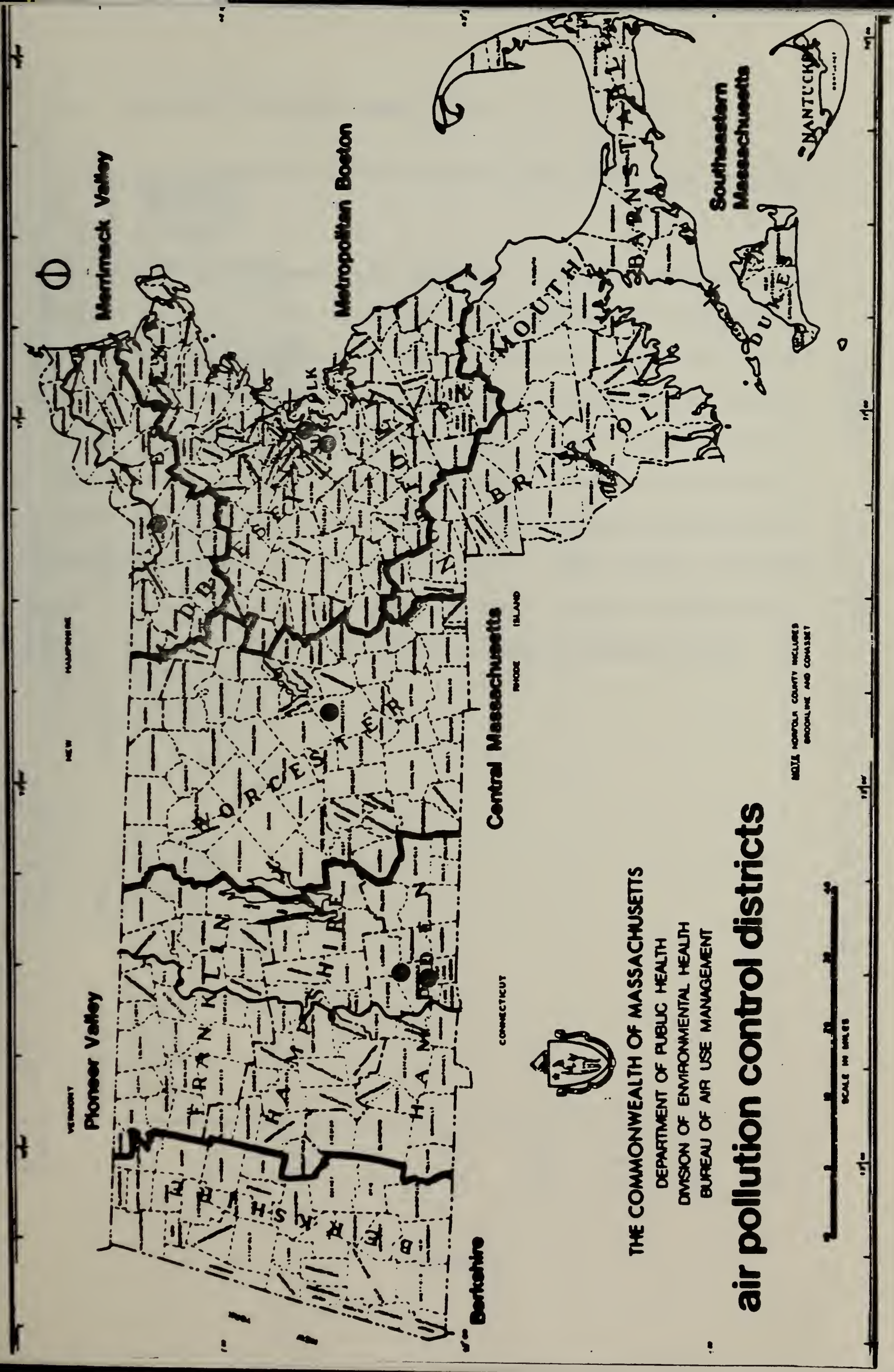
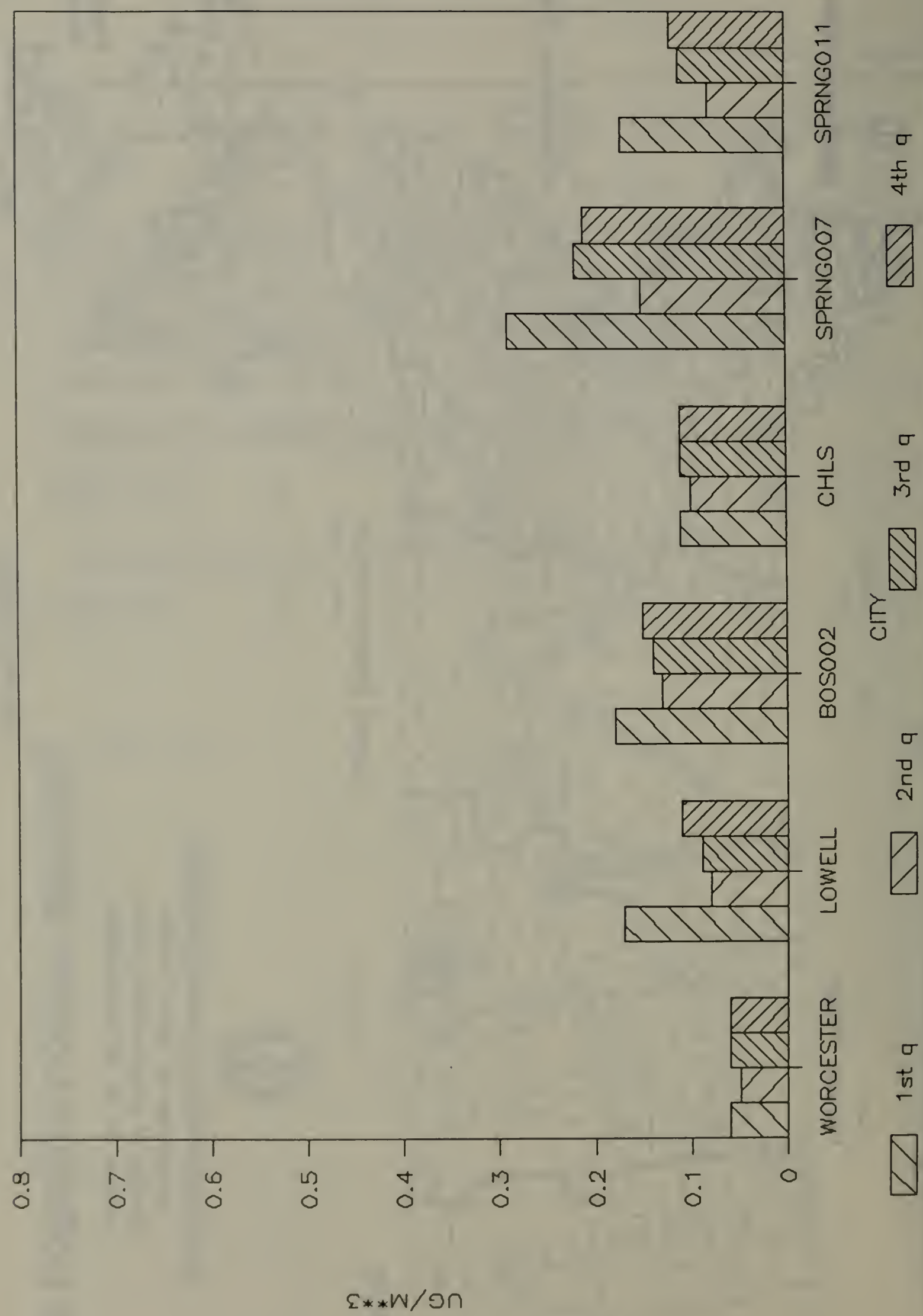


Figure 11

QUARTERLY LEAD LEVELS: 1986



G. POLLUTANT STANDARD INDEX (PSI)

1. Definition

The Pollutant Standard Index provides a simple, uniform way to report concentrations of ozone -- the predominant form of photochemical oxidants or smog. Through its statewide ozone monitoring network, DAQC evaluates the previous day's ozone level and predicts the following day's ozone concentration based on the analysis, NO_x values and on weather forecasts. A PSI value of 100 is equivalent to the national ambient air quality standard for ozone (.125 ppm). DAQC reports ozone PSI values daily during the months of April through October for three areas: Eastern, Central, and Western Massachusetts.

(2) TABLE 13 PSI Index and General Health Effects

| Index Value PSI Descriptor * | General Health Effects | Cautionary Statements |
|---------------------------------|---|--|
| 500 | | |
| hazardous | Premature death of ill and elderly. Healthy people will experience adverse symptoms that affect their normal activity. | All persons should remain indoors, keeping windows and doors closed. All persons should minimize physical exertion and avoid traffic. |
| 400 | | |
| hazardous | Premature onset of certain diseases in addition to significant aggravation of symptoms and decreased exercise tolerance in healthy persons. | Elderly and persons with existing respiratory diseases should stay indoors and avoid physical exertion. General population should avoid physical activity. |
| 300 | | |
| very unhealthful | Significant aggravation of symptoms and decreased exercised tolerance in persons with heart or lung disease with widespread symptoms in the healthy population. | Elderly and persons with existing heart or lung disease should stay indoors and avoid physical activity. |
| 200 | | |
| unhealthful | Mild aggravation of symptoms in susceptible persons, with irritation symptoms in the healthy population. | Persons with existing heart or respiratory ailments should reduce physical exertion and outdoor activity. |
| 100 | | |
| moderate | | |
| 50 | | |
| good | | |
| 0 | | |

* American Lung Association

TABLE 14 1986 PSI by Region

This table represents the number of days during the ozone season (April-October) that fell into the good, moderate, and unhealthy categories. In 1986, there were no days in the very unhealthy category.

| <u>Month</u> | <u>PSI</u> | <u>Eastern Region</u> | <u>Central Region</u> | <u>Western Region</u> |
|--------------|-------------|---------------------------|---------------------------|---------------------------|
| APRIL | Good | 26 | 23 | 24 |
| | Moderate | 4 | 2 | 6 |
| | Unhealthful | 0 | 0 | 0 |
| MAY | Good | 18 | 21 | 18 |
| | Moderate | 12 | 10 | 13 |
| | Unhealthful | 1 | 0 | 0 |
| JUNE | Good | 9 | 14 | 19 |
| | Moderate | 18 | 14 | 10 |
| | Unhealthful | 3 | 2 | 1 |
| JULY | Good | 11 | 17 | 15 |
| | Moderate | 16 | 13 | 15 |
| | Unhealthful | 4 | 1 | 1 |
| AUGUST | Good | 10 | 16 | 18 |
| | Moderate | 21 | 15 | 13 |
| | Unhealthful | 0 | 0 | 0 |
| SEPTEMBER | Good | 21 | 26 | 26 |
| | Moderate | 9 | 4 | 4 |
| | Unhealthful | 0 | 0 | 0 |
| OCTOBER | Good | 25 | 27 | 29 |
| | Moderate | 6 | 2 | 2 |
| | Unhealthful | 0 | 0 | 0 |
| TOTAL | Good | 120 | 144 | 149 |
| | Moderate | 86 | 60 | 63 |
| | Unhealthful | 8 | 3 | 2 |

H. SULFATES - PRIVATE SITES

1. Sampling Method

Sulfate measurements are taken at private monitoring sites using a standard high volume air sampler. In this procedure, air is drawn through a preweighed, 8"x10" fiberglass particulate filter. The filter is placed in a beaker with 40 milliliters distilled, deionized water. This is covered for 30 minutes and then poured through a Whatman #42 filter into a 200 ml volumetric flask. Approximately 40 milliliters hot distilled, deionized water is added to a beaker, which is covered and left to sonicate for 10 minutes in an ultrasonic bath. The beaker and filter pieces are rinsed two or three times, and the diluent filtered and collected in a flask. At the conclusion of the sampling, the filter is removed and transported to the laboratory for analysis. The analysis involves turbidimetry using a Hach turbidimeter and sulfaver reagent.

2. Summary of Data

There were 10 privately-operated sulfate monitors in 1986 (Figure 12). One site, Springfield (2160-010) was not incorporated in the report as only 19 observations were made. All other sites had at least 80 percent data capture. Sulfate monitors of these sites are operated by the Pioneer Valley Private Monitoring Group and by Boston Edison. Table 15 shows that the highest levels of sulfate were recorded at Springfield (37 ug/M³, site 2160-013).

(3) TABLE 15 - PRIVATE SITES
1986 SULFATES MONITORING RESULTS

SO₄ Units: ug/M³

| City | Saroad Site# | Number of Obs. | Minimum Obs. | Daily Maximum Obs. | | 3rd. | Annual Arithmetic Mean |
|------|--------------|----------------|--------------|--------------------|------|------|------------------------|
| | | | | 1st. | 2nd. | | |

PIONEER VALLEY AIR QUALITY CONTROL REGION (042)

| | | | | | | | |
|-------------|----------|----|-----|----|----|----|---|
| Chicopee | 0400-006 | 52 | 1.3 | 34 | 34 | 24 | 9 |
| Northampton | 1600-003 | 54 | 0.2 | 17 | 15 | 14 | 8 |
| Springfield | 2160-009 | 59 | 1.3 | 22 | 34 | 20 | 9 |
| Springfield | 2160-012 | 56 | 1.8 | 21 | 26 | 22 | 9 |
| Springfield | 2160-013 | 57 | 0.1 | 22 | 20 | 14 | 8 |

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION (119)

| | | | | | | | |
|-----------|----------|----|-----|----|----|----|---|
| Boston | 0240-018 | 55 | 3.0 | 23 | 19 | 19 | 9 |
| Boston | 0240-019 | 57 | 2.0 | 22 | 21 | 16 | 7 |
| Boston | 0240-020 | 59 | 2.0 | 22 | 18 | 18 | 7 |
| Boston | 0240-021 | 59 | 2.0 | 22 | 19 | 17 | 8 |
| Sherborn* | 2042-001 | | | | | | |

* Data for this site is presently under review.

2. Summary of Data

In 1986, 8 state operated sites monitored PM_{10} (Figure 13). Six sites used the high volume (SA321A) method. None of the sites exceeded the standard. Charlestown (site 0240-027, 122 ug/M^3 , 41 ug/M^3) and Springfield (site 2160-007, 120 ug/M^3 , 44 ug/M^3) recorded the highest levels (Table 16). Two sites, Boston (0240-002) and Ware (2360-002) used the Dichotomous sampler. The maximum 24 hour value recorded with this instrument occurred in Boston (85 ug/M^3) for PM coarse.

I. PM₁₀

1. Sampling Method

DAQC employs size selective inlet devices (SSI), the high volume Anderson sampler (SA321A) and the low volume Dichotomous sampler (SA244E), to record PM₁₀ levels. PM₁₀ refers to particulate matter less than 10 micrometers in aerodynamic diameter. Thus, gravimetric measurement of PM₁₀ involves direct weighing of selected particles removed from a known volume of air. The total weight of collected particles is divided by the volume of air sampled to arrive at the pollutant concentration. Samples taken with the high volume method are collected on an 8x10 inch quartz filter. Though the Dichotomous sampler also filters a known volume of air, particles are collected on two 50 mm. round teflon filters. This method allows for distinction between particulates measuring 0-2.5 micrometers and 2.5-10 micrometers, collecting them on separate filters. To obtain the PM₁₀ total, particulate weight of both filters are summed. For the high volume (SA321A) method, EPA found instruments prior to 1987 biased high by up to 20 percent. The influence of coarse particles creates an excessive distribution of values for the standard. Where the Anderson sampler is used, the associated uncertainty permits values up to 60 ug/M³ (annual) and 180 ug/M³ (24 hour) without terming them exceedances. Both methods meet equivalency requirements published by EPA in (40CFR 50.7 July 1, 1987).

FIGURE 12: Air Sampling Network Sulfates 1986 - Private Sites

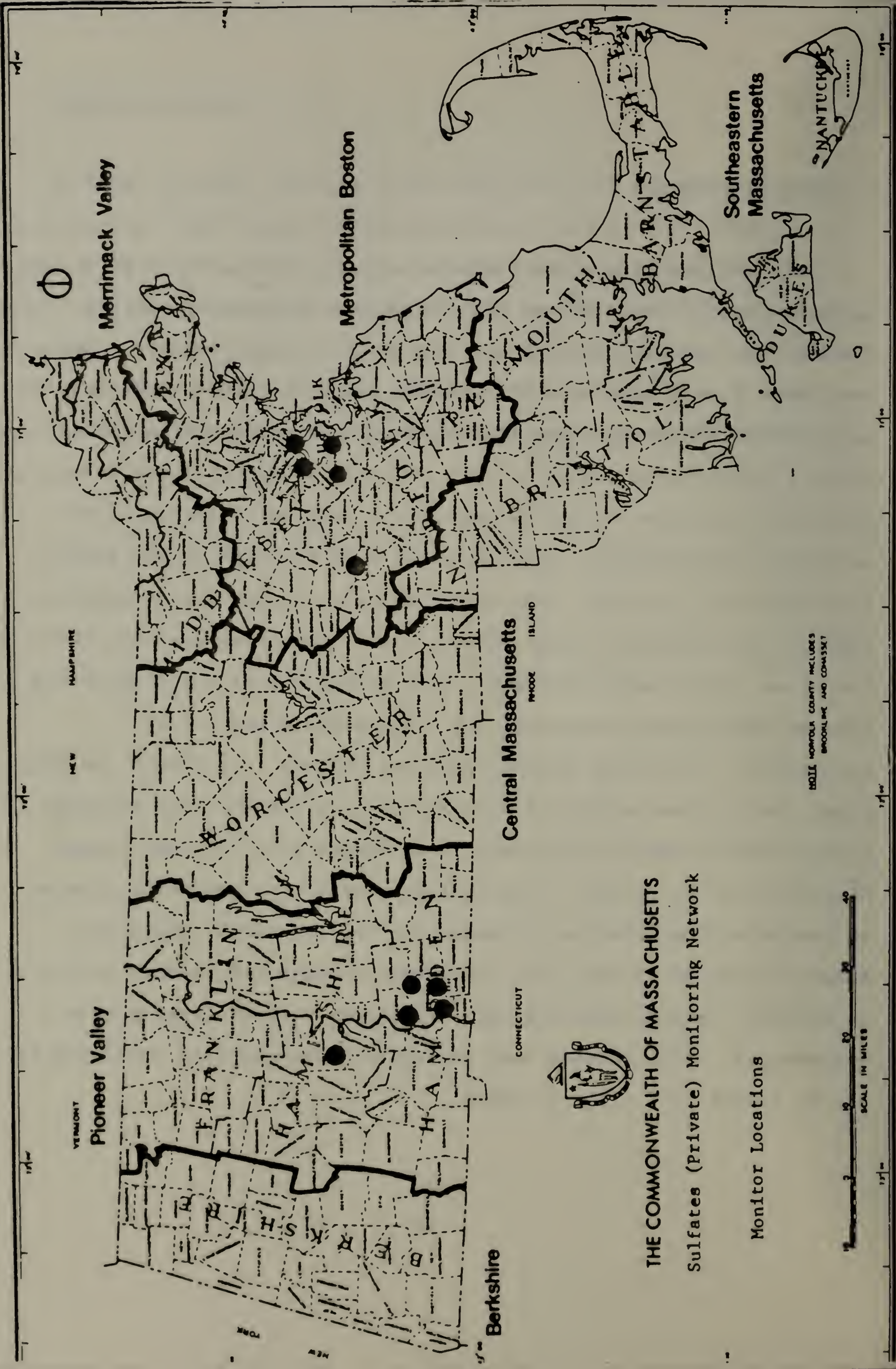


TABLE 16 - PM10 PUBLIC SITES

1986 SUMMARY

PM₁₀ units: ug/M₃

| City | Saroad # | Instrument Method | Number of Obs. | Max Daily Obs. | 2nd Max Obs. | 3rd Max Obs. | Annual Mean |
|------|----------|-------------------|----------------|----------------|--------------|--------------|-------------|
|------|----------|-------------------|----------------|----------------|--------------|--------------|-------------|

CENTRAL MASSACHUSETTS AIR QUALITY CONTROL REGION

| | | | | | | | |
|-----------|----------|----|----|----|----|----|----|
| Worcester | 2640-016 | 52 | 57 | 70 | 63 | 59 | 30 |
|-----------|----------|----|----|----|----|----|----|

MERRIMACK VALLEY AIR QUALITY CONTROL REGION

| | | | | | | | |
|----------|----------|----|----|----|----|----|----|
| Lawrence | 1000-005 | 52 | 57 | 67 | 65 | 60 | 27 |
|----------|----------|----|----|----|----|----|----|

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

| | | | | | | | |
|-------------|----------|----|----|-----|----|----|----|
| Boston | 0240-024 | 52 | 51 | 97 | 75 | 72 | 39 |
| Charlestown | 0240-027 | 52 | 58 | 122 | 84 | 73 | 41 |

PIONEER VALLEY AIR QUALITY CONTROL REGION

| | | | | | | | |
|-------------|----------|----|----|-----|----|----|----|
| Springfield | 2160-007 | 52 | 57 | 120 | 77 | 69 | 44 |
| Springfield | 2160-011 | 52 | 54 | 68 | 65 | 47 | 29 |

| City | Saroad # | Instrument Method | PM Range | Num. of Obs. | Max Obs. | 2nd Max Obs. | 3rd Max Obs. | Annual Mean |
|------|----------|-------------------|----------|--------------|----------|--------------|--------------|-------------|
|------|----------|-------------------|----------|--------------|----------|--------------|--------------|-------------|

METROPOLITAN BOSTON AIR QUALITY CONTROL REGION

| | | | | | | | | |
|--------|----------|----|--------|----|----|----|----|----|
| Boston | 0240-002 | 01 | 0-2.5 | 91 | 58 | 55 | 55 | 20 |
| | | | 2.5-10 | 89 | 85 | 55 | 53 | 13 |

PIONEER VALLEY AIR QUALITY CONTROL REGION

| | | | | | | | | |
|------|----------|----|--------|-----|----|----|----|----|
| Ware | 2360-002 | 01 | 0-2.5 | 188 | 33 | 32 | 32 | 13 |
| | | | 2.5-10 | 188 | 26 | 26 | 22 | 7 |

